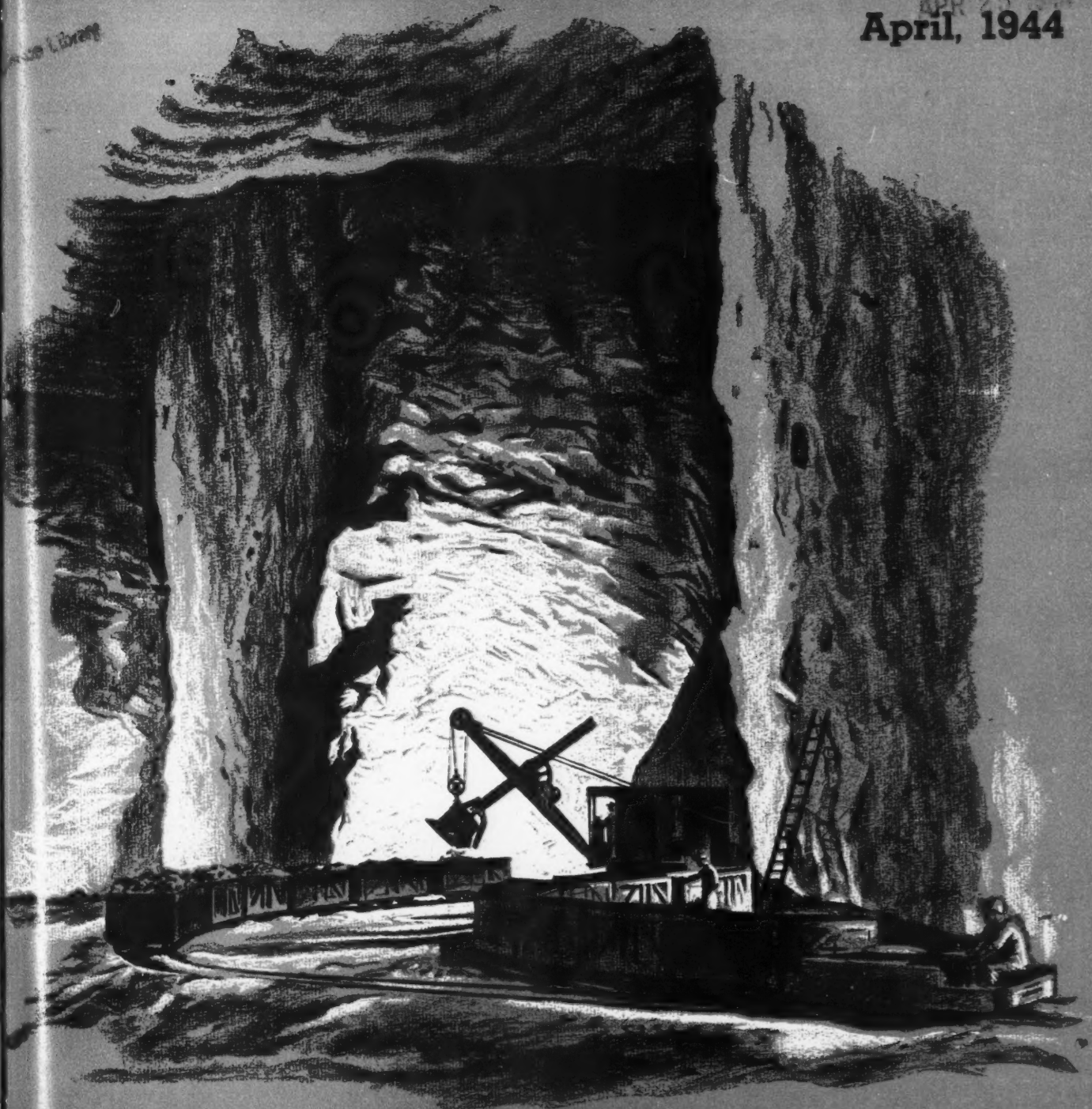


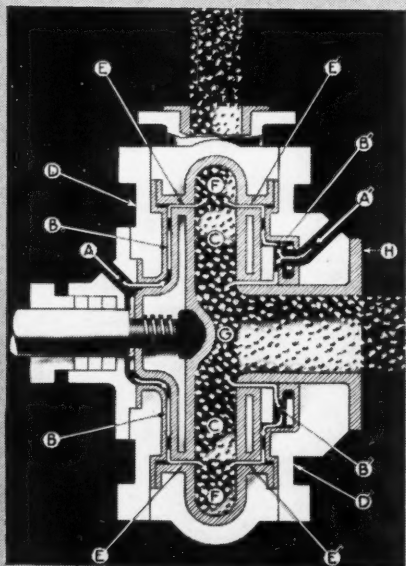
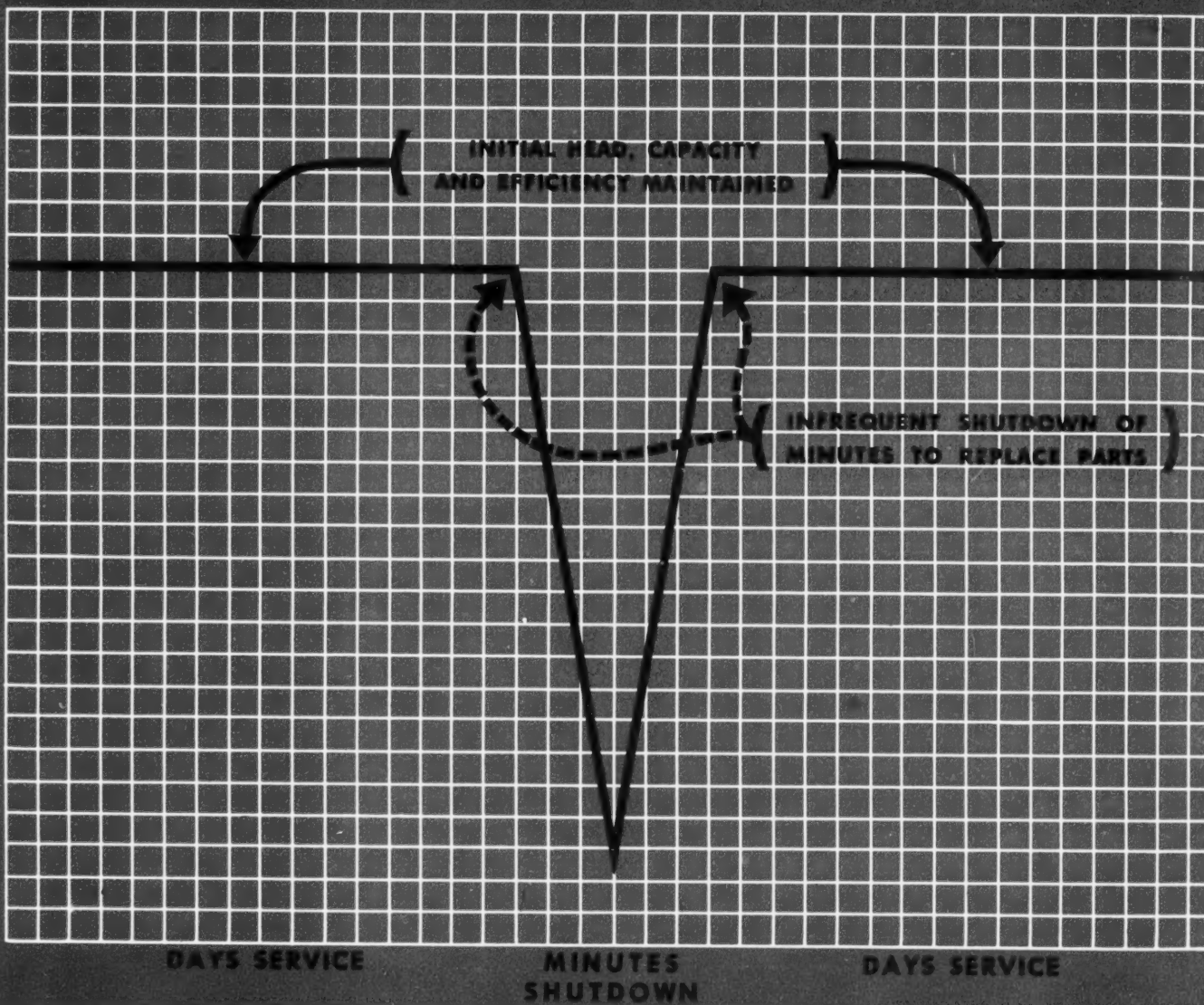
ENGINEERING AND MINING JOURNAL

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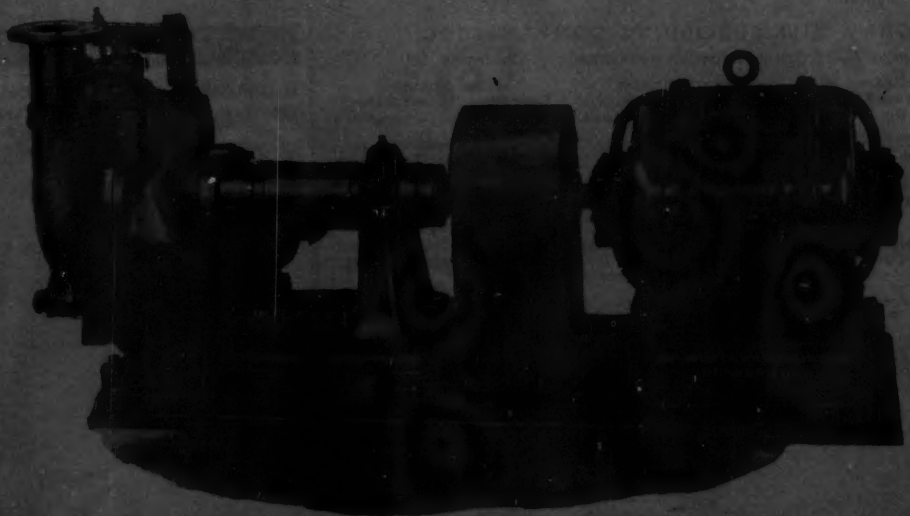
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ENGINEERING AND MINING JOURNAL

H. C. Parmelee, Editor

Legislation to Conserve Marginal Deposits

NOW IS THE TIME to determine a national policy for marginal mineral resources which, if abandoned, are likely to be lost for good and all. A large number of mines and stripper wells will have to cease operating when wartime prices decline and special premiums are abolished. Unless such projects are artificially supported, the resources involved in many instances are likely to be so lean that they will never be worth making accessible again. In those cases where good judgment suggests that the resources are worth saving, and the cost of extraction will be substantially lessened by preventing abandonment at this time, something should be done to preserve the operations intact. We suggest to the members of Congress most familiar with the mineral industries that this problem should be the subject of immediate legislation.

The purposes should be to preserve desirable resources in the public interest, to stabilize employment, and to bolster national security by reducing our dependence on outside sources of supply in an emergency. The security feature would be superfluous if it were evident that our statesmen are making any progress toward international collective security, but current developments indicate that neither Russia nor Britain is thinking in such terms. This being the case, it behooves us to look to the security of our sphere of influence.

The needed legislation should provide for purchase of the marginal production for government account, the same to be stockpiled or marketed according to the judgment of the committee in control. The controlling committee should have unquestionable qualifications, both in an industrial sense and in the ability to think in terms of the public interest, and should represent experience both in the industries affected and in pertinent government departments. The chairman of the committee should serve full time and be a Presidential appointee subject to Senate approval. Other industry members should be chosen in the same manner but need not serve full time. Departmental appointments would be at the discretion of department heads. Probably it would be desirable to have the same com-

mittee handle both the marginal resource subsidies and the contemplated stockpiling program. However, the committee in either case should be small, and its technical and staff work should be delegated to established agencies, such as the Bureau of Mines, Geological Survey, and Metals Reserve Co. The committee should determine policy under the enabling act and should assume final responsibility for decisions.

Purchases should be made from marginal properties or marginal portions of economic properties at rates specified by the committee and at prices that will afford a nominal profit to the operator after paying standard wages. Each property should be considered separately, and there need be no obligation to give uniform treatment to different producers of the same mineral. Depletion in both operational and tax accounting should be limited to a cost basis. The reason is that the resource, or portion thereof, which needs a subsidy can hardly be represented as having value. An alternative option should be to grant the ordinary depletion allowances permitted in the federal revenue code less the amount of gross income in excess of market prices.

Examples of conditions that would warrant the purchase of output under this plan would be flooding, intolerable pollution expectable from future unwatering, caving, extraction of adjacent deposits, pulling of casing, and the impairment of facilities now available. The basis for undertaking purchase should be evidence that failure to do so would make future use of the resources substantially more costly in terms of effort and materials than would extraction at the present time. In order to make the burden on taxpayers as light as possible, the product, if stockpiled, should be kept in the crudest state consistent with accessibility, low storage cost, and non-deterioration.

In some cases logical conservation might not mean to foster extraction as soon as possible, but to carry on certain maintenance operations, such as pumping or timbering, or to purchase or maintain certain facilities that would otherwise be removed or would depreciate.

In contributing to national security, the policy should

be to maintain sufficient productivity to assure a continually improving know-how, and to serve as a nucleus in case an emergency makes expansion necessary. Also, in this category comes the maintenance or operation of whatever treatment facilities are in the national interest to preserve, such as the Longhorn tin smelter now operating in Texas.

Although it is desirable to define as closely as possible in law the aims, policies, and limits of such a program, in this case it seems as though efficient operation would require the exercise of considerable discretionary power by the committee set up under the enabling act. The

act should have a definite term, such as two or three years, so that its stewards will be called to account periodically by Congress. The decisions of the committee should be based on adequate findings of fact. Both fact finding and decisions should be subject to public comment in open hearings. Findings of fact should be subject to court review on appeal.

The introduction of such legislation as soon as possible will be a notable public service which is likely to save the nation valuable resources, conserve the value of investments made for war purposes, provide desirable employment, and buttress our national security.

We Want Portal-to-Portal Pay, Too!

THAT CRUEL AND INHUMAN form of punishment—a ride on the New York City Subway system—was never better described than in Justice Murphy's opinion in the Alabama miners' portal-to-portal pay case. Without disparaging the miners' rights in the matter, we can't help pointing out that the logic of the high court's opinion applies also to us, humble subway rider that we are. Just listen to Justice Murphy:

"They ride in spoon-fashion with bodies contorted . . ." "These subterranean walks are filled with discomforts and hidden perils. The surroundings are dark and dank. The air is increasingly warm and humid, the ventilation poor. Odors of human sewage permeate the atmosphere." ". . . the journey to and from the portal involves continuous physical and mental exertion as well as hazard to life and limb."

If that isn't an accurate, even understated, account of what we have to go through every morning and evening on our way to and from work, we will eat Justice Murphy's robe. In the morning we shove our way into a subway train and for 55 minutes thereafter we are driven to a continuous physical and mental exertion that combines the worst elements of Swedish massage and a trip over Niagara Falls in a barrel. Spoon-fashion, he says! When those subway guards get through

ramming us back into a corner and piling on top of us at least twice as many citizens as the car ought to hold, we look and feel like one of those cubical bales of scrap iron fresh from the hydraulic press.

Furthermore, we ride, and also have to walk, through "dark, malodorous" tunnels filled with a noxious vapor compared to which the air in the Alabama mines is as tangy and piquant as a sprig of balsam. In fact, no decent mine inspector would allow men to enter, let alone work in, a hole where the air was as bad as it is in the lower levels of the Times Square station at 5:15 of a hot summer afternoon. Oh, those miners have it rugged, Justice Murphy, rugged!

The worst of it is that, whereas these poor miners get handed a couple million shinplasters to cover their alleged bruises, we have to fight our way daily through conditions just as bad, and pay for the beating besides. In fact, the City Fathers are now trying to find a way of gouging an extra nickel a ride out of us.

What this is all leading up to is our determination to form a union of the several hundred thousand subway riders in New York and demand portal-to-portal pay, too. We just haven't made up our minds, however, whether to tell our troubles first to Justice Murphy, to Mrs. Roosevelt, or to John L. Lewis and District 50.

Magnesium and Justice

IT HAS BEEN A FAVORITE DEVICE of the Department of Justice to pillory in public statements the principal producers of the light metals for having impeded the war effort by restricting peacetime production through alleged cartel agreements with foreign producers. Thus, Mr. Thurman Arnold, when he was Assistant Attorney General, indulged publicly in unsupported accusations against the Dow Chemical Company and its magnesium production, prejudicing public opinion against the company before its story could be told. And more recently Mr. Wendell Berge, Assistant Attorney General, in a public address on cartels, gave voice to this literary gem: "The shortages of aluminum and magnesium resulting from cartel restrictions forced us to strip the kitchens of

America and scar our public squares with scrap piles." All of which is oratorical nonsense, unworthy of a responsible public official.

We believe it can be demonstrated that, but for the research, development, foresight, and preparedness of the maligned producers of the light metals, the United States would have been in a sorry plight with its airplane production program. We believe it is also demonstrable that at no time has war production been handicapped for lack of light-metal production. That both aluminum and magnesium have been and now are in plentiful supply is testimony to the ability of the producers to more than meet a demand which, incidentally, they anticipated more accurately than did military or civilian

authorities. In our judgment their record is more creditable than that of their critics, who, as far as we are aware, have yet to prove their allegations.

In order to defend publicly the record of his company in magnesium production, Dr. Willard H. Dow, president of the Dow Chemical Company, has submitted to the Truman Committee a formal statement, recently released. It is a record of typical American initiative, resourcefulness and tenacity, honesty of purpose, and creation of a great national asset. But more, it refutes the baseless charges of the Department of Justice to which so much blatant publicity was given, but which were never proved.

The record is too long and detailed to present here; but it contains some facts that should be widely known. In 1943 the rated annual capacity of all magnesium plants in the U. S. A. was 580,000,000 pounds. The Dow group produced 60 percent of all magnesium made, although it controlled only 44 percent of the total rated capacity. Dow produced at 87 percent of its rated capacity, the others at 46 percent of theirs. Of the money spent by the Government in magnesium

plants, there was an investment of \$0.80 per pound of metal produced in Dow plants, against \$1.67 in the others. Dow's knowledge and experience gained over the years at its own expense and effort served the nation well in time of crisis. The company continuously reduced the price of magnesium from \$5 per pound in 1915 to 21 cents a pound in 1939.

All things considered, it is not surprising that Dow asked the Truman Committee to affirm or negate the belief that "the Dow record in magnesium is one of the highest public service." Of the allegation of the Department of Justice that Dow belonged to an international cartel that regulated production and prices, Dr. Dow said, "It is an infamous charge." And further, "Every act complained of . . . as against the public interest was actually in the public interest, and, if anyone impeded the magnesium program, it was not Dow. The Dow Chemical Company . . . served the nation in spite of and not because of the Government."

It looks as though the nation could take pride in Dow's magnesium record. Would that as much could be said for the performance of the Department of Justice.

For Better Core-Drill Records

NEGLECTED DRILL CORES and drilling records may represent a regrettable waste of effort. There are many instances of such neglect. "We all know of places where there are sheds with roofs tumbling in, housing boxes of drill cores which are rotting and crumbling," said T. M. Broderick last November, at a mineral industries conference in northern Michigan. "In many cases the companies which did the work are no longer in existence and no one is responsible."

Some day such core might be re-studied profitably, had it been properly preserved. Every single fragment is an actual sample of the rock traversed by the drill hole

at some given point. As knowledge of the area grows and new procedures in ore-finding are developed, the story told by the same piece of drill core may be very different from what it is today.

Improved core-drill records are suggested by C. A. Dobbell in a useful article on page 86 in this issue. He shows how photography may be effectively employed to supplement description. The technique described would permit re-study of the core at any future time in the light of changed conditions, even in the absence of the core—this in addition to any immediate advantages that might possibly be derived.

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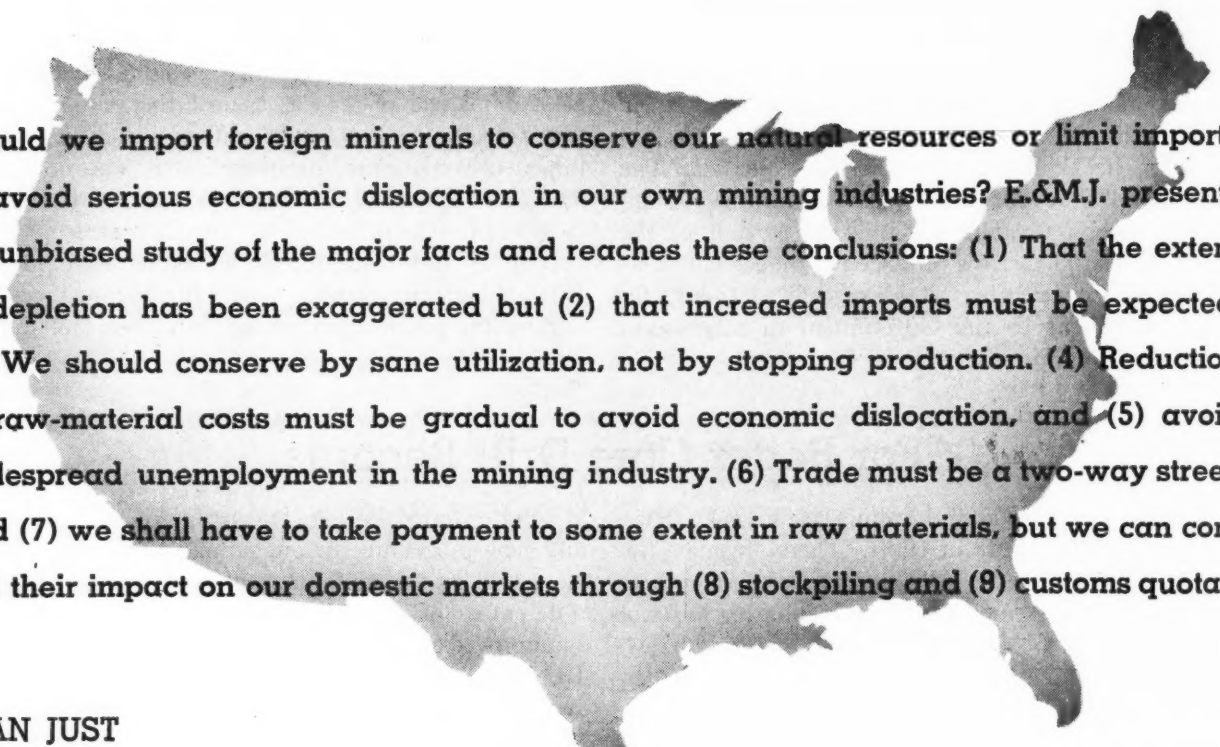
WARTIME RESTRICTIONS on the use of paper have made it necessary to limit the number of copies of *Engineering and Mining Journal* that may be printed. A "ceiling" was established when WPB ordered the first 10 percent cut in paper consumption for 1943, and has not since been altered. A second cut, of 15 percent, for 1944 has greatly aggravated the publisher's problem. All sorts of economies have been effected to reduce the tonnage of paper used without curtailing editorial service or further limiting the number of copies available. Lighter weight

paper has been used, margins have been trimmed, writing has been condensed, and numerous practices and customs that prevailed when paper was plentiful have been abolished.

But in spite of these economies the publisher is unable to fill promptly all new subscriptions to *E.&M.J.* A waiting list of substantial proportions has accumulated—subscriptions that must be deferred for several months before they can be entered. Only as old subscriptions expire without prompt renewal can new subscriptions be entered on the list.

Present subscribers to *E.&M.J.* who want to insure uninterrupted receipt of the *Journal* should respond promptly to renewal notices, five of which are sent at suitable intervals before expiration. Failure to renew on time will terminate the subscription automatically, and a belated request must then be added to the waiting list. So, if you want uninterrupted service on your subscription, please watch your expiration date and renew promptly. The publisher will give you ample notice and make it easy to avoid embarrassment on our part as well as yours.

National Policy on Mineral Imports



Should we import foreign minerals to conserve our natural resources or limit imports to avoid serious economic dislocation in our own mining industries? E.&M.J. presents an unbiased study of the major facts and reaches these conclusions: (1) That the extent of depletion has been exaggerated but (2) that increased imports must be expected. (3) We should conserve by sane utilization, not by stopping production. (4) Reduction of raw-material costs must be gradual to avoid economic dislocation, and (5) avoid widespread unemployment in the mining industry. (6) Trade must be a two-way street, and (7) we shall have to take payment to some extent in raw materials, but we can control their impact on our domestic markets through (8) stockpiling and (9) customs quotas.

EVAN JUST
Associate Editor

AS SURPLUSES of minerals grow and the trend toward cutbacks of mineral production mounts, rising concern is evident among domestic producers over the question of mineral imports. Miners and their spokesmen inveigh against curtailment of their activities while the foreigner is said or implied to go merrily on his way benefiting from government purchase of his output at continued high prices.

Although the question of discrimination in cutbacks seems to be a focal point of industry attention, inseparable from this problem is the relationship between domestic production and imports after the war. The debate on this subject, already commenced, promises to widen into a major battle of considerable duration. On the one hand is a new school of conservationists, stemming from manufacturing industry, who propose drastic curtailment of domestic mining and strong encouragement of mineral importation. Denouncing this viewpoint, exponents of domestic mining demand additional compensation for their high wages and rising costs. They imply that we can look forward to continued self-sufficiency in minerals.

Also involved is the question of government participation in importing of minerals. Should the government import minerals to stockpile for national security? Should it accept minerals in payment for Lend-Lease and the additional debts anticipated in financing the job of world reconstruc-

tion? If so, should the minerals be stockpiled or offered for sale?

To inform our readers and to assist in the development of views on these subjects, the writer has discussed these problems with a number of interested parties, including both industry and government men. The information and opinions which follow are offered in the light of that research.

No Preference in Cutbacks

There have been numerous accusations and insinuations on the part of domestic producer interests that foreign shippers are receiving preferential treatment. Consequently it was something of a surprise to find on actual investigation that there is no basis for such charges unless one adopts the extreme view that discrimination exists if there is any reduction of domestic purchases, prices, or premiums while any importations whatsoever are made. Government men connected with foreign mineral purchases insist that at no time has any significant amount of foreign production enjoyed higher than ceiling prices from this government, less freight charges. There have been a few minor instances of special treatment, but by and large there has been no parallel to the system of bonus prices and premiums set up in this country. Some of the arrangements made have

waived the U. S. import duties, this benefit being passed on to the foreign shipper or government. As to the duration of contracts, all are cancellable on short notice, none carrying irrevocably beyond July of this year. In the matter of cutbacks, officials contend that in no case has foreign production enjoyed preferences and that in most cases the foreign producer has had more severe treatment than his domestic competitor.

This is a remarkable record considering that most of these foreign purchase agreements were made when the situation was dominated by scarcities or the fear of scarcities, and, further, that Latin-American economies are seriously dislocated by the war, and foreign raw materials must be kept out of Axis hands. It seems as though the stewards of our foreign mineral purchases are more entitled to the gratitude of domestic producers than to the numerous brickbats which have been hurled in their direction.

1. Scarcities Have Been Exaggerated

We have been regaled recently with the views of industrialists such as William L. Batt, chairman of the Combined Raw Materials Board, and Captain Eddie Rickenbacker, calculated to cause alarm over the state of depletion of our mineral resources, urging a great expansion of our dependence on imports and drastic curtailment of domestic production.

Parties competent to pass on mineral industry problems will agree that Mr. Batt *et al* are unduly alarmed. The problem of depletion is not new. It is magnified by treating estimates of proven reserves as though they represented ultimate reserves, a practice to which experience lends no weight. Also, the apparent depletion is accentuated by the lack of development work caused by shortages of mine labor. The war has simply added about two years of normal output to the ordinary rate of depletion. The problem cannot be lightly dismissed; however, there is no cause for panic, or a sudden reversal of what passes for mineral policy.

On the other hand, it seems unfortunate that spokesmen for domestic mining refuse to take the problem of depletion seriously. It does no good to talk blandly of vast undeveloped resources without offering any specific information as to where these resources are and giving some idea if they are minable at prices which seem likely to prevail. Such an argument simply tends to discredit the substantial facts on which the case for domestic mining is based. The domestic producer claim based on his higher wage costs, boosted arbitrarily by government action, and on lower ore grades is one that cannot be dismissed any more lightly than can the problem of depletion.

We report as an observed fact that Washington opinion on this subject, even among those best acquainted with the mining industry, is closer to the Batt attitude than to the industry's. In other words, the emphasis is on conservation and a greater dependence on imports.

2. Greater Imports Are Indicated

Even if we double or triple the commonly accepted estimates of national reserves of copper, lead, zinc, high-grade iron ore, bauxite, or the strategic minerals, the results are not impressive enough to laugh the conservationists out of court. When we take into account that our national economy is still expanding, it seems inevitable that sound national policy will call for importation of greater percentages of our mineral needs than prior to the war.

This does not mean that we can afford to cause drastic, painful changes in our domestic mining economy. However scientifically such changes might be premised, there are

too many people and communities dependent on domestic mining to permit sudden changes to be feasible. A stern policy in this respect is more likely to force the political pendulum back toward isolationism than to produce any beneficial result. Also, the problem of national security cannot be neglected. We still live in a nationalistic world. Despite the utterances of officials charged with foreign policy, the evidence suggests that currently we are losing rather than gaining ground in the matter of international collective security. Until such security is assured, we dare not risk being caught short in a future emergency. If the maintenance of reasonable self-sufficiency involves some cost, probably it will be less than the cost of the armaments necessary for security by the alternative route.

In this connection, common sense dictates that the government should take the declining rate of discovery seriously enough to afford special inducements for prospecting and development in the tax laws. Even in Canada, where depletion is much less advanced than in this country, serious consideration is being given to creating important incentives to prospect and develop. In our case probably benefits obtainable through additional depletion allowances would be insufficient. It might be better to look to special bonuses or tax credits tied directly to amounts spent for prospecting and development.

3. Conserve by Efficient Utilization

Ideas of conservationists unfamiliar with the economy of the mineral industries seem to lean toward putting mineral deposits under lock and key. Competent study may lead to the conclusion that in some cases the peacetime rate of depletion should be reduced, but there will be few if any instances where sharp curtailment of established domestic industry will be warranted. Such a course would neglect the circumstance that our resources have been marvellously expanded by improvements in efficiency which only full-scale operations can evolve. There is no informed basis for assuming that sound conservation can be practiced by locking up the resources and restricting technical and managerial advancement to laboratory and pilot-plant operations.

There is also the circumstance that civilization has not yet suffered from conservation through maximum utilization. The adaptability of industry to changing conditions has always resulted in adequate substitutes being found when sufficient need has existed. Moreover, our experience with the strategic minerals during the war suggests that we are not likely to deplete any resource to the extent that extra effort will not afford a supply.

Also, there are some instances of marginal deposits which have been opened for war purposes where shutting down operations after war needs are satisfied will be a form of waste rather than conservation. This refers to cases where the ore left in the ground cannot be expected to pay for future unwatering, pollution, retimbering, or otherwise making it accessible again. There is also the problem of making use of plant facilities while they are intact. In other words, the most efficient use of certain marginal resources will be to deplete them while they are easily accessible and while treatment facilities are readily available.

4. Low-Cost Materials vs. Dislocation

Considering that the most extreme conservationist statements have come from men identified with durable-goods manufacturing, it seems reasonable to assume that to some extent this thinking reflects the desire of such manufacturers to ease postwar competition by seeking the lowest possible raw-material costs. Also, they may wish to improve

foreign purchasing power for their products by balancing exports with raw-material imports at the expense of the domestic miner.

This kind of thinking glosses over the problem of national security, as it does not seem possible that taxpayers will stand for the cost of acquiring the colossal stockpiles necessary for full protection without domestic production.

Moreover, some of these conservation-minded manufacturers do not take into account the economic dislocations that would result from drastic curtailment of mineral production. They might do well to ponder the views enunciated by Dr. John Coulter at the recent Denver meeting of the American Mining Congress and Colorado Mining Association. Dr. Coulter insists that the international weight of our domestic economy is such that we cannot have a prosperous world without a prosperous United States. He holds that there cannot be a prosperous United States without prosperity in all the important regions and industries of the country. Specifically, he states that there cannot be national—and therefore international—prosperity unless the 11,000,000 people of 17 Western states enjoy prosperity (*E. & M. J.*, Feb., p. 164). If this reasoning is valid, then we can add that these 17 Western states cannot hope to have good times if domestic mining is drastically reduced. The lesson seems to be that the peacetime rate of domestic mineral production should not be arbitrarily changed without careful and competent study, and that any changes indicated by such study must be made slowly.

Some of our enthusiastic proponents of foreign market development ought to examine the relative importance of domestic and foreign markets before they undertake to throw our national economy out of balance. To cite the case of automobiles, for example, it has recently been shown (*The American Automobile*, March, 1944, pp. 12-23) that whereas we have 32,677,797 automobiles operating in this country at the present time, all the rest of this hemisphere including Canada has only 2,449,934. The U.S.S.R. is estimated to have 750,000. Before the war Great Britain had less than 2,600,000, France about 2,400,000, and Germany, 1,515,000. China had about 50,000. The expansion of these limited foreign markets involves not only purchasing power, but changed habits of life, an enormous program of road construction, and creation of extensive service facilities. Obviously, such changes are not going to take place overnight, or even in ten years. What is to keep the wheels turning meanwhile if we dislocate the domestic economy?

Also, before we sacrifice the miner on the altar of manufacturing industry, it may be worth while to inquire if manufacturing and distribution are making a social contribution equal to that of mining and agriculture in terms of efficiency. Raw-material costs usually represent only a minor fraction of the costs paid by final consumers. In some cases savings in raw-material costs are not passed on to final consumers. Certainly, in some cases more efficient distribution could provide higher revenues to raw-material producers and still reduce the retail prices of finished articles.

5. Tariff Protects Mine Employment

Domestic mining men have always believed it to be self-evident that American labor has a big stake in tariff protection. They assume that labor will fight shoulder to shoulder with them in any battles over tariff adjustments, particularly in view of the way wages have been jacked up during the war. Therefore, they will be profoundly interested in statements recently made by James Carey, secre-

tary of the Congress of Industrial Organizations: Carey said that the CIO has made a comparison of protected and unprotected industries and has come to the conclusion that tariff protection boosts prices and profits, but not wages. Therefore, Carey stated, CIO has reversed its views and will hold for tariff reductions in the future. The CIO theory seems to be that the threat of injurious low-wage foreign competition can be removed by working toward the improvement of foreign living standards.

To pass on the validity of these views for all industries is beyond the purview of *Engineering and Mining Journal*. Offhand, it seems as though this reasoning is directed at wage rates rather than employment. Also, the lifting of foreign living standards is likely to take a very long time, as all human experience teaches that people change their ways slowly. However, speaking for the mining industry, there can be no doubt whatsoever that the capacity of protected mineral producers to pay wages or even to provide jobs at all is profoundly affected by tariff protection and similar elements which influence prices. The mining industry is tied to its orebodies. Facing their steady depletion, it cannot hope to have the prices of its products reflect gains in efficiency as faithfully as can manufacturing and distribution. Thus, it cannot entertain equal hope of overcoming tariff reductions without cutting wages or production or both.

6. Trade Is a Two-Way Street

Besides the inescapable facts of depletion, the domestic producer must face the fact that we cannot expect to go on, as we have in the past, having exports exceed imports by a large margin and taking the balance in gold. The capacity and the willingness of foreign countries to trade in this fashion are practically exhausted. Also the continued collection of most of the world's gold into our Treasury is likely to threaten the continued prestige of gold as an international medium of exchange, as foreign countries which lack gold are bound to seek some alternative means of settling international balances through credit devices. If gold is sidetracked in international commerce with most of it on our hands, the goods and services with which we purchased it will simply have been given away, leaving us as the butt of another great international maneuver.

The necessity of trade being a two-way street is pointed up by current British efforts to build a trading entente. Having expended much of their capital in the war and being absolutely dependent on a large volume of trade to sustain reasonable prosperity in the United Kingdom, the British are terrified at the possibility of a depression after the anticipated postwar boom is over. They have an even greater national debt than ours in comparison to national income, and realize that they must have a continued high level of trade in order to carry the debt. Believing that the United States will not adopt controls to prevent depression and will probably return to its prewar habits of trade, the British want to safeguard themselves against the impact of a depression in this country. They hope to do this by building a trading bloc consisting of the British Empire, Portugal, France, the Low Countries, Norway, and possibly others. Within this bloc tariffs will be reduced and trade must balance. If it does not, the creditor elements must arrange to take payment in goods or sacrifice credits of three years' standing. Trade with outside nations will be welcomed, but only on the basis of even exchange or a surplus of exports.

However, to concede the necessity of planning to make our trade with the world balance in terms of goods and services does not mean that trade need be compensated entirely in the raw-material field, as some observers seem

to anticipate. The raw-material producers should insist that the burden of trade is distributed proportionately among the country's industries, at least in cases where government action is involved.

7. Debts Must Be Paid in Goods

Some industries, such as the wool growers, being faced with surpluses in government hands, are taking the position that these inventories should be destroyed rather than be offered in the markets, even when prices are good. Obviously, neither common sense nor taxpayers will permit the destruction of useful materials, simply to please a minority. The net result of such a position will be to discredit the recalcitrant industry in the public mind.

If we are to make any collection in payment for the goods we have poured out via Lend-Lease—and collection is certainly implied in the phrase—we have to expect to receive payment in such goods or services as the debtor countries are able to provide. Certainly, the country's taxpayers are not going to stand for forgiving these debts if they can be collected, simply to please any given industry which may be faced with the competition involved. However, if there is no basis for permanent stockpiling of materials thus received for future national security, the domestic competitor is justified in demanding that these materials should not be dumped so as to disrupt his market. It is not unfair on his part to ask that such goods be put into the markets only at such times as they can be absorbed without dislocation of the industry involved.

The collection of debt is not likely to be restricted to Lend-Lease obligations. The world faces an enormous job of reconstruction after the frightful devastation of the war. Unless reconstruction is to take a very long time, and the world is to endure economic stagnation meanwhile, a large share of the credit needed will have to come from the United States, there being no other country able to bear the burden. This viewpoint may be distasteful to some who believe that we are not the world's keepers. However, there arises the question of the extent to which we can expect to enjoy national prosperity in a stricken world. Apart from humanitarian considerations, we may be faced with the choice of helping get the devastated nations back on their feet as quickly as possible or of suffering from depression while they slowly reconstruct their economies as best they can. If we extend credit for foreign reconstruction, we shall have to try to work out means of repayment that are compatible with the abilities of the debtors to pay. This involves being willing to accept payment in such goods as the debtor nations produce in excess of their own needs. The public will expect the affected industries to cooperate in the absorption of such goods, provided reasonable precautions are exercised in disposal.

8. Stockpiles Urged As Cushions

Because minerals are more or less indestructible and because national security will be bolstered by large stockpiles of essential minerals, the mining industry is able to receive contributions from abroad without serious shock. Minerals can be stockpiled indefinitely at minimum cost. Also, they have such a good record of having permanent value as materials that the taxpayers whose investments are tied up in them can enjoy maximum assurance of safety. Thus, there is not likely to be strong pressure to throw accumulated stocks into the markets willy nilly, as might be the case for more perishable or less essential materials.

Therefore, it would seem like good policy on the part of the mining industry to cease opposing the collection of foreign loans in part by mineral shipments, simply asking

that any surpluses exceeding national security requirements be fed discriminately into its markets and as far as possible through the ordinary channels of trade.

9. Quotas Will Aid Our Producers

If it is accepted that we must look forward to greater dependence on imports for mineral supplies, both because of depletion and in order to help balance trade, there remains the problem of protecting the domestic industry against ruinous foreign competition without stifling foreign trade. It was as a means of compromising this difficult problem that *Engineering and Mining Journal* suggested the use of customs quotas (December, 1943, pp. 79-80).

Since this suggestion was made, such reactions as have been expressed have been unfavorable. In the absence of competitive economics, business thinking in this country has become so saturated with idealism that anyone who doubts that we are going to live in a beautiful dream world of unbridled competition and minimum-cost production dares not raise his voice for fear of being suspected of sinister intentions. Also, some spokesmen for domestic mining, who refuse to face the circumstance that we are no longer able to provide self-sufficiency at reasonable cost, are opposing quotas because they view them as curbs rather than as benefits. Probably when they digest our true position with respect to imports, they will welcome quotas as life savers.

There can be no doubt that quotas are not an ideal solution. They tend to straitjacket trade, complicate human relations, and bring government more than ever into industry's affairs. They would be unacceptable if there were any painless answer to our mineral tariff problem. However, there appears to be none. The need for greater and greater dependence on imports calls for some means of declining tariff protection. The too obvious solution would be to set up a schedule of diminishing tariff rates, changes being gradual over a period of many years. The trouble with such an arrangement is that, with declining ore grades, deeper mining, and rising wage costs, the operators of such mines as it seems sound national policy to keep in business must look forward to increasing production costs. A declining price schedule does not fit their situation. Furthermore, for the industry to try to mine under adverse price conditions is decidedly unconservative. This was emphasized by Professor Langford in his recent proposal for a planned economy for Canadian mining (*Bull. Canadian Institute of Mining and Metallurgy*, Feb. 1944, pp. 114-138). If the average mine operator is given the choice of being pinched as to his output or as to the prices of his products, there can be little question that he will elect the former choice. Therefore, an arrangement which gives him price protection, even though it restrains his output, is a benefit to him and his wage levels under the conditions we face. For these reasons, we predict that customs quotas will find more sponsors as people awaken to the changed world in which we now live.

Summarizing the foregoing, there seems to be little cause for complaint on the part of domestic producers that they have suffered from discrimination in favor of foreign competitors. There is little doubt that we shall depend more heavily on mineral imports in the future than has been our custom in the past; however, sudden changes in domestic mining economy should be avoided. The industry would be wise to acquiesce gracefully to the acceptance of mineral shipments in payment of foreign debts, providing said minerals are not thrown indiscriminately into the markets but are stockpiled, either for national security or for gradual absorption into our domestic economy. Quotas are again recommended as a compromise solution of the perplexing problem of mineral tariffs.

Reclaiming Quincy Tailings From Torch Lake



C. HARRY BENEDICT, Chief Metallurgist,
Calumet & Hecla Consolidated Copper Co., Lake Linden, Mich.

NEW SUCTION DREDGE at work on Quincy's bank of amygdaloid sands in Torch Lake. The suction pipe, which is carried on the pontoons, delivers to the screen at the storage pool at the shore plant

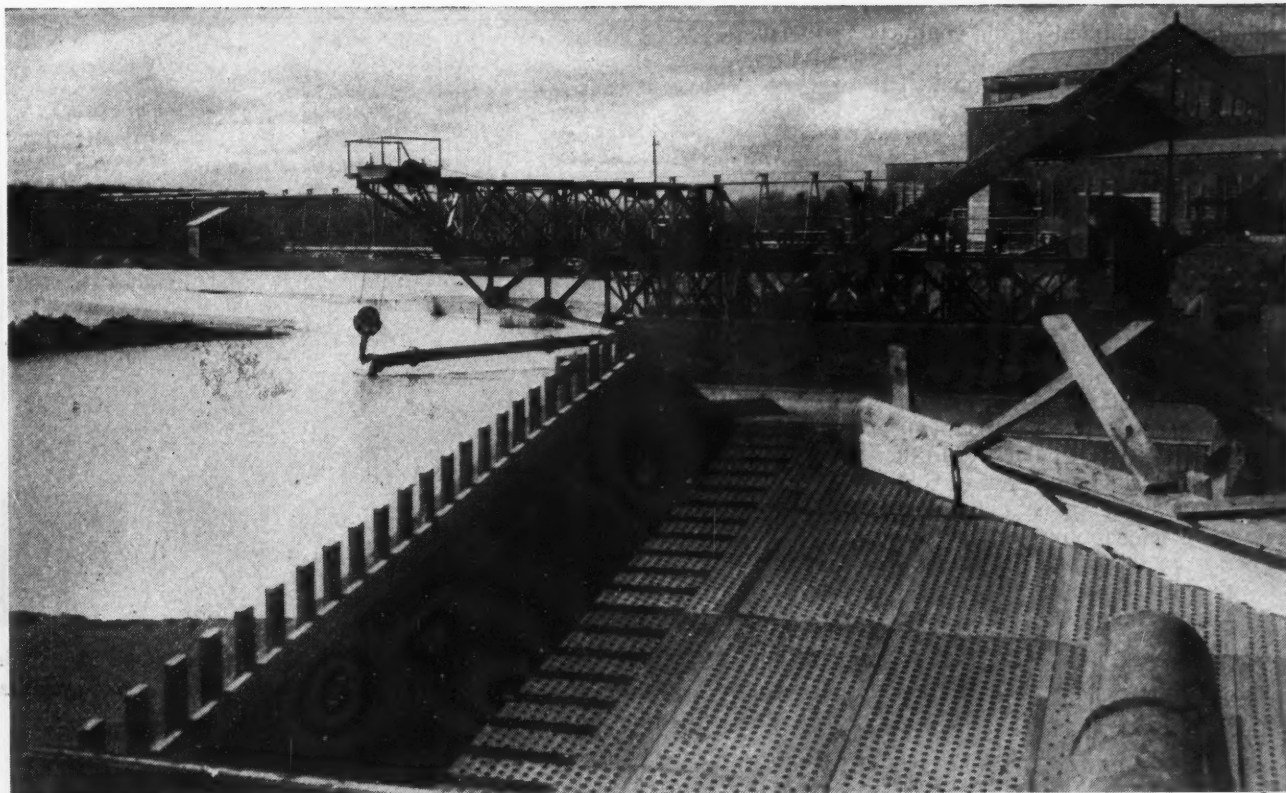
Wartime demand added its incentive to the proposal to recover the copper from the 50-year accumulation of tailings which Quincy Mining Co. had stored in Torch Lake, in the Michigan Copper Country—a venture that previously had seemed unlikely to return the necessary investment. Once a favorable decision was reached, Calumet & Hecla Consolidated Copper Co. was chosen by Quincy and the Metals Reserve Co. to design the plant required and put it into successful operation, and to serve as trustee in letting the contracts. The plant was started in November, and the entire operation has been under the direct supervision of Mr. Benedict, who contributes this article

THE CONCENTRATING PLANTS, or stamp mills, as they are known locally, of the Lake Superior copper district in northern Michigan are located either on the shore of Lake Superior or of some one of its tributary inland lakes. Along one of these, Torch Lake by name, are situated the mills of the Calumet & Hecla Consolidated Copper Co. at Lake Linden, the old Tamarack mill at Hubbell, and the Quincy Mining Co.'s stamp mill at Mason, the distance between the extreme plants being about 4 miles.

Torch Lake is peculiarly well adapted for the receipt of tailings from a concentrator and in turn for recovering them by dredging out of the lake. The shores slope gently to the water's edge and the lake itself is very deep for its area. This makes for a compact body of sand which lends itself readily to dredging and the transportation of the material to the only slightly elevated plants along the lake shore.

Calumet & Hecla has been operating two such re-treatment, or reclamation, plants for many years with great suc-

cess. The material treated in them has until recent months been conglomerate sands or tailings derived from treating the ore of the very rich Calumet conglomerate lode. Almost 500,000,000 lb. of copper has been reclaimed from Torch Lake since 1915 from this source. For many years the success of this operation naturally has attracted attention to the possibility of the economic development of the lower-grade amygdaloid deposits which constitute the other large tailing piles in this district.



AT THE STORAGE POOL the sands delivered by the dredge are discharged onto this rubbish screen. From the pool they are pumped to the shore plant through a line suspended from the radial bridge

Commercial possibilities of the Quincy sand bank had long been recognized by the Quincy management, but the development was considered a marginal venture at best, not to be undertaken at the price of copper prevailing in recent years. It was believed that the material might be treated at an operating profit at 12c. copper, but it was more questionable whether the returns from such an operation would be adequate to pay an annual interest as profit and also return the original investment. With the outbreak of the war and the need for as large a supply of copper as possible, the project seemed worth undertaking. Inasmuch as the capital could be obtained from the Metals Reserve Co., and a premium for copper in excess of 12c. was also forthcoming, advantage was taken of these favorable conditions and an application for funds was made and was approved by WPB and Metals Reserve.

The Quincy mill, from which these tailings were deposited, began operations more than 50 years ago. The ore in those days near the surface was richer than in subsequent years at depth. The earlier metallurgical processes, moreover, were crude, so that the tailing bank showed in general a progressive decrease in values from the older near-shore deposits outward in

all directions to the circumference of the pile. It was recognized that it would not be profitable to dredge the entire bank; and accordingly, only the more favorable area was chosen for re-treatment. This was staked out by the Quincy officials and carefully sampled by the metallurgical department of the Michigan College of Mines.

Sampling Procedure

A rectangle 1,200 ft. long and 450 ft. wide, embracing the richest part of the sand, was surveyed, and this was divided into 12 squares, each 300 ft. long by 150 ft. wide. In the center of each the sampling hole was churn drilled. The entire contents of the hole were sampled, each 6 ft. of depth constituting an individual sample. From these samples an average value of the contents of the sand was obtained, which was applied to the tonnage as represented by the rectangle. In this manner, allowing for sloping banks, the average tonnage was calculated, and from the assay value of the sand, the copper contents.

Based on previous experience in the Quincy concentrator and with test runs in a pilot plant treating this same sand, the anticipated metallurgical results were set forth by the Michigan College of Mines. Tonnage and values

disclosed was sufficiently promising to warrant the expenditure of \$1,150,000, estimated as the cost of the plant.

The material finally to be dredged was not to be limited to the portion outlined and sampled. This amount of sand, it was understood, would probably yield the capital expenditure, at a return to Metals Reserve of 4c. per pound of copper. When operation of the dredge began it started at the outer corner and on what was probably the leanest part of the section sampled, and the preliminary results to date seem to indicate the accuracy of the sampling and of estimating the reserves.

Net results of this sampling showed sufficient tonnage of sand at an assay value that promised to return the plant cost within a reasonable time, and Metals Reserve undertook to furnish the capital necessary for the venture, amortization to be made by Quincy company at a fixed sum per pound of copper produced.

Inasmuch as Calumet & Hecla had had many years experience with the dredging of sands and conveying this material to the treatment plants along the shore, as well as with the recovery of the values from the sands, it was chosen by Quincy and Metals Reserve to design the plant and to act as trustee for the two companies so far as

the design work and letting contracts were concerned, and also to put the plant into successful operation. The preliminary features of this venture have all been successfully accomplished, and since Nov. 1, 1943, the plant has been operated by the Quincy Mining Co. personnel.

In designing the plant, the features successfully proved by Calumet & Hecla for dredging and classifying the sand and conveying it to the treatment plants were followed closely. Metallurgical treatment follows the general practice used on the amygdaloid sands as distinguished from the treatment of conglomerate sands. The main difference is that good recoveries of copper can be obtained from the amygdaloid sands by fine grinding and flotation, whereas on the conglomerate sands it is necessary to use leaching to make satisfactory recovery of the fine copper.

Plant of Four Units

The plant as a whole consists essentially of four main units:

1. A floating dredge for sucking the sand from the lake and propelling it through a flexible pipe line supported on pontoons to a fixed point on the shore.

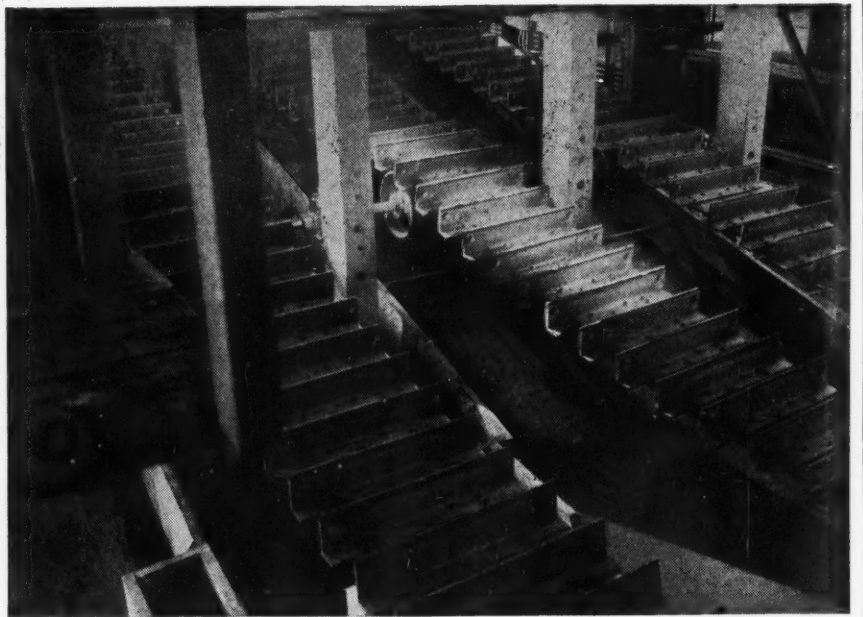
2. A shore plant or classifying house which comprises a stationary dredging pump and a radial bridge carrying the suction pipe of the pump, in addition to machinery for classifying the pumped product into coarse material requiring regrinding and fine material or slime ready for flotation.

3. A gallery housing a belt conveyor to convey the coarse sands from the shore plant to the regrinding plant and into a surge or storage bin at the end and highest point of that plant.

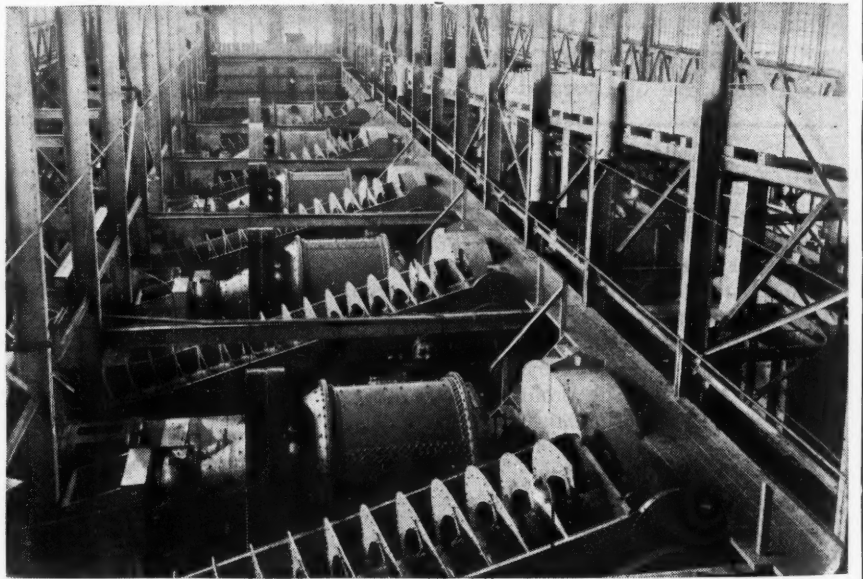
4. A regrinding plant and concentrator equipped with ball mills and flotation machines, with the necessary equipment for dewatering the sands and filtering the flotation concentrates.

The dredge was designed by the Bucyrus-Erie Co., South Milwaukee, Wis. Hull and house are of wooden construction and were built by R. C. Buck, Inc., of Superior, Wis. The dredge is capable of cutting its own flotation and digging to a depth of 70 ft. below water level with the ladder inclined at 45 deg. All machinery units and pumps are arranged for direct drive, using 3-phase, 25-cycle, 2,300-volt current, which is delivered to the stern edge of the hull via the pontoon line. The 20-in. pump, complete with 1,000-hp. motor, coupling, and sub-base, was furnished by Calumet & Hecla. All other machinery was obtained from or through Bucyrus-Erie.

The ladder for supporting the out-



TRIPLE-BELT DRAG CLASSIFIER in the regrinding plant. The sands are delivered to the storage, or surge, bin ahead of the grinding mills. The fines after settling and thickening go direct to flotation



IN THE REGRINDING PLANT the sands are ground in ball mills operating in closed circuit with spiral classifiers, the overflow of which goes to flotation

board suction pipe is 95 ft. long and of the latticed-girder type, with wire-rope side guys anchored to hinged-pivot connecting brackets located on the deck of the hull. It is raised and lowered by means of a hoist drum mounted as a separate unit on the port-side winch sub-base. In addition to this ladder hoist, the port-side winch consists of three drums which control the port-ladder swing line, the port-bow swing line, and the port stern line. The starboard winch consists of four units controlling the center stern line

in addition to the corresponding units on the port side.

Besides the main dredge pump there are two 8-in. motor-driven pumps, each capable of delivering 2,500 g.p.m. against a total head of 175 ft. These pumps are for the dual purpose of delivering high-pressure water to the mouth of the suction pipe, so as to disintegrate the sand bank in advance of the ladder, and to supply pressure water for breaking up the ice in the dredge pond during the winter.

In dimensions, the hull is 100 ft.

long, 56 ft. wide, and 9 ft. deep. It has overhanging deck brackets 8 ft. wide on each side. It is built with a center well for the suction ladder and with the bow corner tapered to permit digging close to the bank. The bow gantry for supporting the ladder-suspension tackle and the two main longitudinal hull trusses are of structural steel. It has multiple watertight compartments.

The suction line consists of 20-in. inside-diameter pipe, 3/4-in. thick. Connection between ladder and hull is made by means of a swivel elbow and rubber suction hose. The lower end of the pipe on the ladder terminates in a special suction-head casting having a water chamber fitted with nozzles for high-pressure jets to loosen the material ahead of the ladder.

Built of 20-in. outside diameter steel pipe, the dredge discharge is made up into 60-ft. lengths and carried on wooden pontoons. The individual pipes are connected with rubber

sleeves, and current for operating the dredge is transmitted from shore through wires carried on towers supported on the pontoons.

The hull was constructed in mid-winter on one of the sloping tailing piles along Torch Lake and was launched by cutting its passageway through ice some 2 ft. thick. The machinery for the dredge was on hand by April 1, 1943, and late in August the dredge was in place and ready for operation.

Care was used in choosing the site of the shore plant. This was decided upon after preliminary sounding and drilling and was located in such a position as to permit easy dredging out of the basin which would serve as storage pool for incoming sand and to provide also the shortest distance possible for conveying sand to the regrinding plant. The main dredge pump of this shore plant consists of a 12-in. Morris centrifugal pump, the suction pipe of which is carried on a radial bridge.

This bridge is pivoted just outside the structure, the circumferential track having a radius of 35 ft. The bridge extends another 20 ft. beyond the track, and the suction line has a vertical leg 35 ft. long, so that the storage pool consists roughly of a circular basin of about 270 deg. with a radial dimension of 55 ft. The storage thus provided is ample for about 72 hours of operation.

Sand Classification

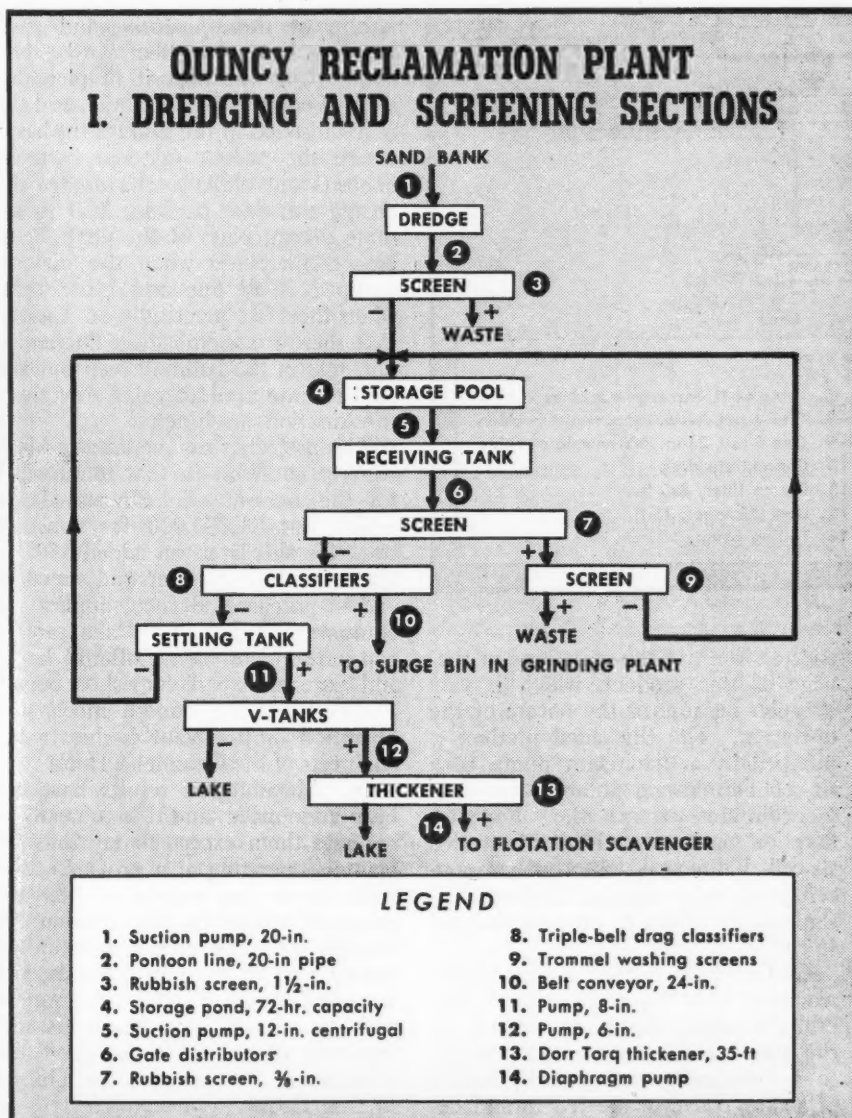
The discharge pipe from the pump empties into a distributing bin which feeds the sand, controlled by gates, onto a screen with 3/8-in. openings to screen out the coarse rubbish. Material passing through the screen goes to a triple-belt drag classifier, the sand discharge of which drops onto the conveyor belt. Classifier undersize goes at about 35 mesh into a series of V-tanks, the thickened plug product of which is pumped directly into the regrinding plant, overflow going back to the pool.

Consisting of a 24-in. belt 260 ft. long between supports, the conveyor is set at an angle of 10 deg. 45 min. It is equipped with an automatic recording weighing scale, so that tonnage record is available. It discharges into a storage or surge bin of sufficient capacity to take care of minor interruptions in operations up to that point. From this bin hand-operated slide gates control the sand fed to the mills.

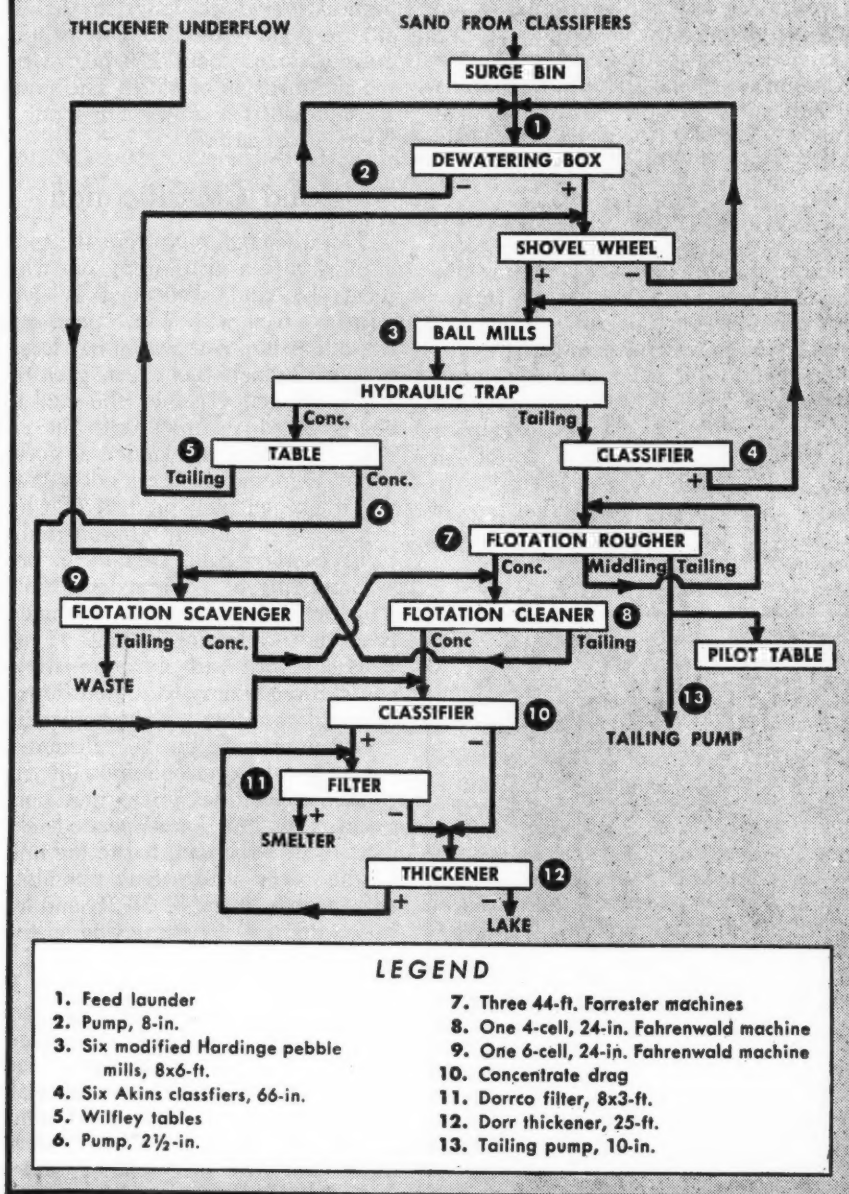
The main structure is a building with a crane span of 28 ft. and two side wings of 48 ft., giving a total width of 124 ft. and length of 255 ft. It has direct railroad connection for incoming supplies and outgoing concentrates. It was dismantled in sections at Lake Linden, where it formerly housed regrinding machinery for Calumet & Helca, and re-erected at Quincy.

Only a little new critical material was required for this building, and in general much used machinery went into the equipment throughout. This was one of the factors that appealed to both the Quincy Mining Co. and Metals Reserve, and made the proposal doubly attractive at the time. In addition to the building, the mills used for regrinding came originally from Calumet & Helca, having been employed at that plant as pebble mills. To convert them to ball mills, it was necessary to increase the size and strength of the driving gears and pinions and the area of the trunnion bearings. The shells themselves, however, were the original Hardinge shells used at the Lake Linden plant.

These ball mills, six in number and 8 ft. in diameter by 72 in. in cylindrical length, are each in closed circuit with a 66-in. Akins classifier. Between the



QUINCY RECLAMATION PLANT II. GRINDING AND FLOTATION SECTIONS



mill discharge and the classifier, a hydraulic discharge is inserted to avoid building up coarse copper in the circuit. The plug product goes to a Wilfley table, the table tailings being pumped back into the circuit. Overflow from two of the Akins classifiers goes to a Forrester flotation machine 44 ft. long. Six of these ball-mill units and three Akins classifiers constitute the original grinding and concentrating sections of the plant.

The slimes classified out in the shore plant which do not require finer grinding are pumped to a series of V-tanks in the wings of the regrinding plant. Here they are thickened and pumped to a 35-ft. Dorr Torq thick-

ener to iron out the variations in tonnage of this product, which is very irregular because of the nature of the operation. The thickened product is pumped by a diaphragm pump to a six-cell Fahrenwald flotation machine. Concentrates from the Forrester flotation machines and those from this six-cell Fahrenwald are further concentrated in a four-cell Fahrenwald, the tailings of which are re-circulated to the six-cell machine.

Concentrates from the Fahrenwald machine, with those from the Wilfley tables treating the plug product of the closed-circuit system, are pumped to a dewatering tank and by means of a drag conveyor are fed to and de-

watered in an 8x3-ft. Dorrco filter. The drag overflow goes to a 25-ft. Dorr thickener, the thickened product of which joins the drag product at the filter. The filter discharges into 50-ton cars for transportation to the smelter.

Flotation follows the standard practice of the district, xanthate and pine oil being the only chemicals used. The sands contain a certain amount of oxidized copper, which may become proportionately greater as the dredge gets into the richer and nearer shore parts of the bank. Up to the present there has been little difficulty from this, and sodium xanthate with pine oil seems ample to make a satisfactory recovery without the need of sulphidizing chemicals. Recovery is not as good as in the stamp mills, due in some measure to the slight amount of oxidized copper present, but more particularly to the irregularity of tonnage and the irregularity in relative size of feed particles.

Fluctuations in Feed

This condition is inherent in the nature of the operation, and there seems to be nothing that can be done about it, as the deposit in place has areas of coarser and finer sand, and this is accentuated in the shore plant basin, where the coarser material naturally deposits out close to the dredge discharge and finer particles float to the more distant parts of the pool. There are certain times when the material pumped is all fine and other times when there are practically no fines, so that there is a tremendous fluctuation not only in the ball-mill feed but also in the slime product going directly to the flotation machines.

The project is unique among Metal Reserve contracts in that it was built for the amount originally asked for, which was \$1,150,000 for construction. To this later was added \$50,000 for a month's tuning up and operation and to purchase advance supplies and equipment sufficient to take care of consumption of balls, ball-mill liners, and spare pump parts for a short period.

Credit for the smooth mechanical operation of the plant is due to the engineers of the Calumet & Hecla company. Metallurgical results have not been announced, and it is too early to evaluate them except to say that the plant is operating at a profit to date, aside from the margin of 4c. per pound of copper for amortization. Inasmuch as the dredge is situated in the leanest part of the sampled area, and as metallurgical results will improve with experience, it is fair to assume that the plant will make good the promises of its sponsors, the Quincy Mining Co.

Government Tungsten Mill Aids Mining in Peru

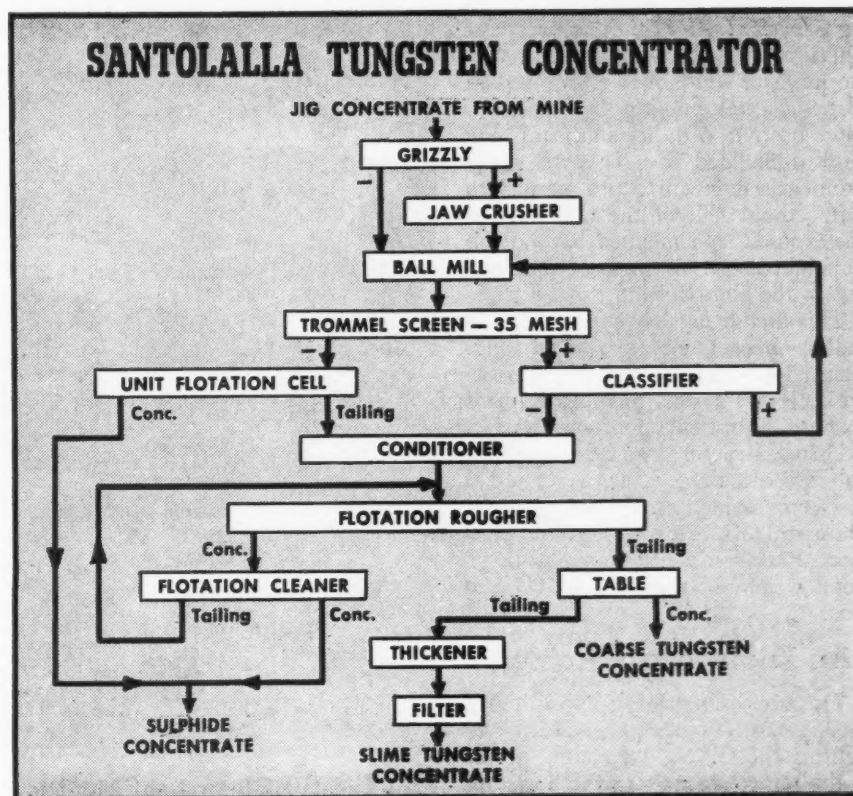
LEONARDO GOMEZ GARCIA, Chief Engineer, Department of Experimental Metallurgy, Institute of Mines and Water Supply, Lima, Peru

FIRST FRUIT of the Peruvian government's current effort to promote scientific exploitation of the country's mineral deposits is a 30-ton tungsten concentrator now operating near Callao. Using an interesting application of flotation, the mill was designed in the ore-dressing laboratories of the newly founded Institute of Mining Engineering, maintained by the government.

Through this agency, which operates under the Ministerio de Fomento, considerable encouragement has been given miners of strategic minerals in Peru, among them those working tungsten deposits in the departments of Ancash and La Libertad and in the provinces of Pallasca, Cabana, and Santiago de Chuco. Wolframite is the principal tungsten mineral in these orebodies, although ferberite is also found. Accompanying these are pyrite, arsenopyrite, and chalcopyrite, with smaller amounts of galena and tungstite. The gangue is quartzose.

The most important of these deposits are owned by Fermin Malaga Santolalla & Sons, a company which produced in the past about 30 tons monthly of concentrate carrying about 67 percent WO_3 and 0.9 to 1.2 percent sulphur. This was done by hand jiggling, and only a small part of the orebodies available could be worked in this way. If no selectivity was observed in mining, the resultant concentrate might carry as high as 10 percent sulphur, even though recovery would be as low as 40 to 50 percent.

The problem of finding a suitable concentration method to permit greatly increased production was brought to the Institute's laboratories by the Santolalla Co., and the following treatment method was worked out: The mine ore, carrying 1.5 to 2 percent WO_3 , was to be crushed and ground carefully, using screens and rolls to minimize slimes; then floated, using both a unit cell and cells in series, to remove the sulphides. The flotation tailing was to be classified hydraulically and sands and slimes were to be tailed separately. Laboratory tests using this method produced concentrates carrying 67 percent WO_3 and negli-



gible amounts of impurities. Recovery was 85 percent.

In floating the sulphides, a 20 percent solution of quebracho was used to depress the wolframite, and the circuit was adjusted to a pH of 6 by use of sulphuric acid. Only 2 percent of the ore's WO_3 was lost in this sulphide concentrate. Because of current difficulties of supply, however, it has not yet been feasible to erect this large-scale plant. Following this investigation, the Santolalla Co. again engaged the Institute to devise a means of eliminating impurities from the company's hand-jiggled concentrates.

An average analysis in percent of this jig product is as follows: WO_3 , 58.50; SiO_2 , 6.40; Fe, 17.20; Pb, 0.56; Zn, 0.70; Cu, 0.34; As, 0.09; Sb, 0.25; S, 5.84; Ag, 5.92 oz. per ton; Au, 0.187 oz. per ton. It is evident that to meet specifications, copper, arsenic, and sulphur must be greatly reduced.

The procedure followed in testing

this material was to grind it to minus-28 mesh, then float it at a pH of 6.0, using sulphuric acid, quebracho amyli xanthate, T-T mixture, and pine oil as reagents; then make the final concentrate by tabling. The result was a concentrate containing about 65.30 percent WO_3 , 0.87 percent sulphur, and 0.02 percent copper.

The method was next tested in a small pilot plant at the Institute, and eventually a 25-ton concentrator was built at Callao, using the flowsheet shown in the accompanying sketch. Reagents are the same as those used in the batch test, and the operation has been successful.

As received at the mill, concentrates carry 50 to 58 percent WO_3 and 4 to 12 percent S; the mill product contains 65 to 70 percent WO_3 and only 0.5 percent S. Recovery is about 95 percent. It is hoped the Institute may create further opportunities to aid development of Peru's mineral resources.

Righting Capsized Dredge Takes 50 Minutes

W. B. MACAULAY, Chief Engineer, Yuba Manufacturing Co., San Francisco, Calif.

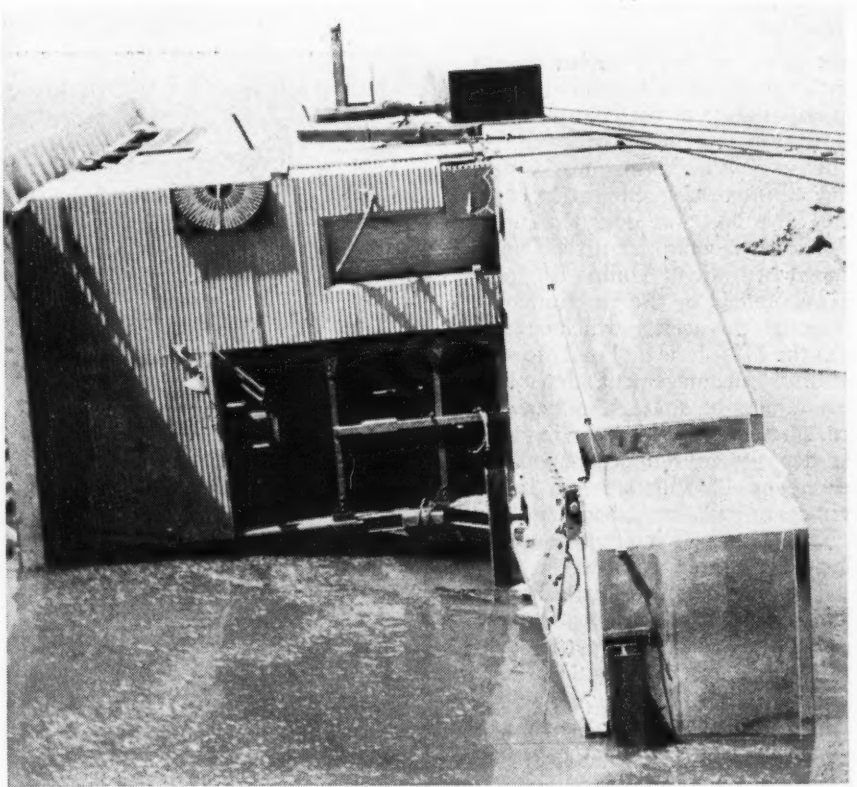
LAST JUNE a placer-mining dredge was being operated by Rand Gold Dredging Associates for the recovery of scheelite, near Randsburg, Calif. On the tenth of the month it capsized in 23 ft. of water, coming to rest on the pond bottom with its starboard side firmly imbedded in a layer of sticky sediment varying in depth from 3 to 8 ft. About half of the hull bottom was exposed, and inclined beyond the perpendicular at an angle of about 95 deg. to the pond bottom.

This dredge is what is known as an endless - bucket - elevator, screen - and - stacker type commonly used for placer work. It has a steel hull made up of separate watertight pontoons, and a steel superstructure and housing. The hull is 75 ft. long, 36 ft. wide, and 6 ft. deep, divided into 16 watertight compartments, each a separate pontoon. Bucket capacity is about 3 cu.ft. Total weight of dredge is about 300 tons.

An Engineering Problem

The task of righting such a dredge though hardly comparable with that of righting the U.S.S. "Lafayette," so far as the respective sizes of the boats are concerned, was an engineering problem based upon exactly the same principle—namely, the unwatering of flooded compartments and establishing a positive righting couple. The hull, if not intact, must be made watertight, and water shipped during capsizing must be removed and the dredge restored to a position where natural forces will float it in its normal position. On July 16, the underwriters awarded to Yuba Manufacturing Co. a contract to right the Rand dredge.

To permit inspection of the hull and to determine the actual condition of the dredge, water was pumped from the pond. Tackle to be used later in righting the dredge was attached to the port side of the hull and connected to deadmen on shore to serve as guys—a safety measure to prevent further movement of the hull while men were engaged in removing machinery and debris from the dredge, and doing other work such as making necessary pipe connections to pontoon compart-



FIFTY MINUTES was sufficient to turn the dredge and float her from the moment when the signal was given to pull on the tackle
1. The dredge on her starboard side in the mud bottom of the dredge pond. Pulling begins at 2 p. m.

ments of the hull. The righting tackle consisted of four parts of 1½-in. wire rope connected to two sets of blocks on shore, each having nine parts of ¾-in. wire rope.

In San Francisco, in the meantime, the engineering department of Yuba Manufacturing Co. planned the work to be done, and calculated the relative positions of the center of gravity of the dredge and the centers of buoyancy for varying submerged conditions; also, the theoretical positions of the dredge along the path of travel to its righted position. To verify these calculations, a sheet-metal model was made of the hull, using a scale of ¾ in. equaling 1 ft. To simulate the machinery and superstructure, a steel block of a correct weight proportional to the actual

weight of machinery and superstructure was used. This block was attached to the hull model by means of two threaded rods perpendicular to the deck, so that its height from the deck could be adjusted to bring the center of gravity of the complete model to its calculated position.

The completed model was floated in a tank to represent the dredge pond, and a series of experiments to determine the proper sequence for righting operations was made. Important results of these experiments were the determination of proper water level in the pond for righting; which pontoons and to what degree should be flooded and later unwatered to assist in righting the dredge; angle of hull in relation to water level at which center of gravity

was directly over center of buoyancy; and angle of hull with the starboard side held to the bottom because of flooded starboard outboard pontoons.

While the experiments described were being carried on in San Francisco, field work at the Rand dredge site was proceeding according to plan. The buckets, spud, stacker, and a part of the digging ladder were removed to the bank. All pontoons were tested with air pressure for 12 hr. to prove water-tightness. Air-inlet and water-outlet pipe connections were installed in the starboard outboard pontoons. A dragline was used to dig a sump some distance from the dredge, into which the sticky sediment in which the dredge was resting was sluiced after being loosened by water pumped through fire hoses and reducing nozzles. Two 1½-in. hold-back lines were attached to the starboard side of the hull and fastened to deadmen on shore.

Ready for Righting

Upon completion of this preliminary work, water again was turned into the pit on Aug. 31. By Sept. 17, the water level had raised in the pit to a depth of 17 ft., which, as determined by model experiments, was the proper depth for righting operations.

At 2 p.m. the ¾-in. lines of the righting tackle were hitched to two Caterpillar tractors (one RD 6 and one RD 8), and the signal was given to pull.

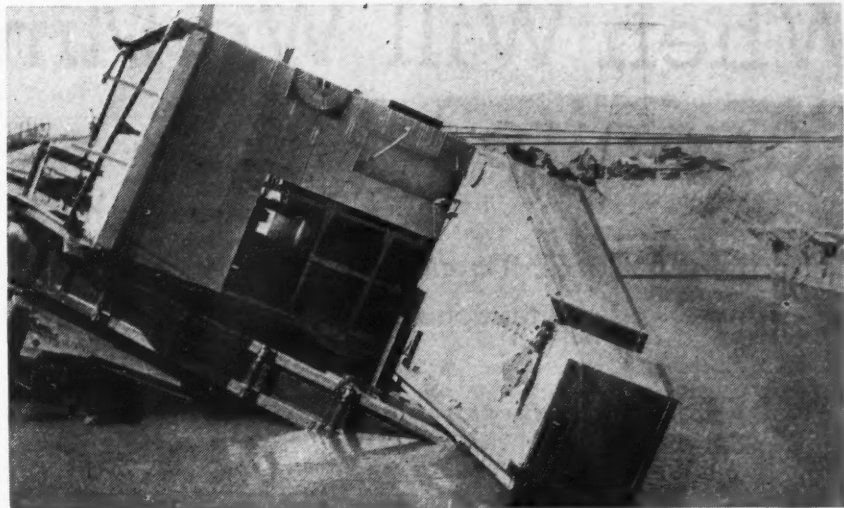
At 2:15 p.m. the dredge turned so that the center of gravity was directly over the center of buoyancy.

At 2:30 p.m. the center of gravity had passed the vertical position of the center of buoyancy and the righting couple was positive, but the starboard side of the dredge was still held firmly to the pond bottom because of the flooded outboard starboard pontoons. At this stage the air inlet hoses previously attached to the starboard pontoons were connected to a small portable compressor, and air under pressure was forced into the pontoons.

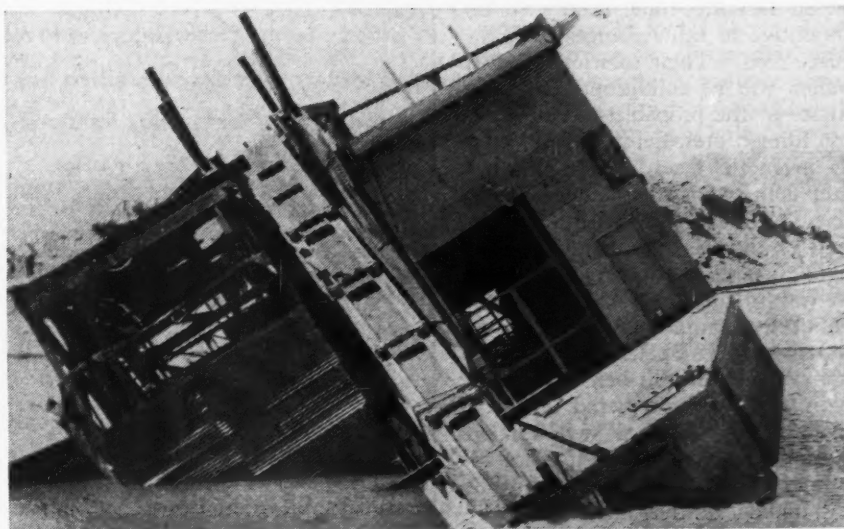
At 2:50 p.m., the dredge was free of the bottom and rose to the surface, floating in its normal, upright position. Fifty minutes was the total elapsed time needed to right the dredge.

The tractors traveled about 200 ft., this short distance being all that was necessary to pull the dredge into a position where the natural righting forces of gravity and buoyancy acted positively and floated it. Total pull by both tractors was about 10 tons.

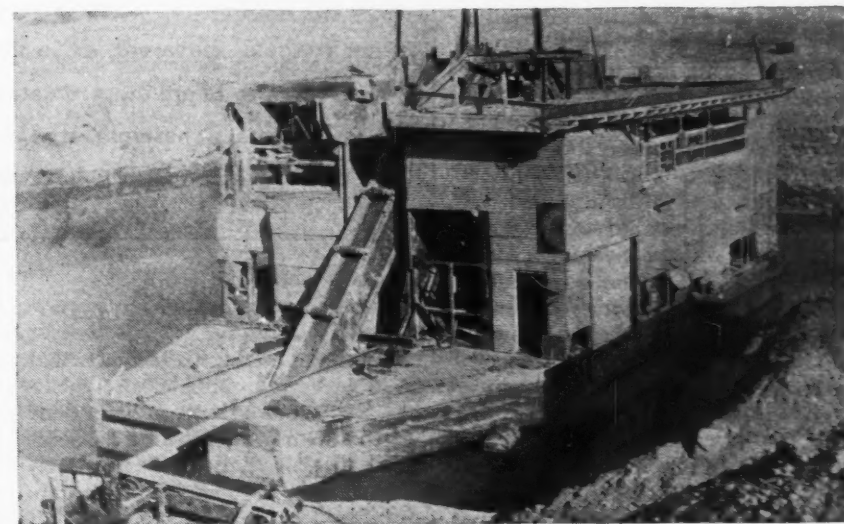
No damage was done to the dredge during righting operations. After it was righted, the pond was again lowered, and the dredge was floated to a bench previously prepared for dry-docking for further repairs.



2. A QUARTER-HOUR LATER, the center of gravity is now directly above the center of buoyancy



3. AT 2:30 P. M. the dredge is ready to rise but is still held down by the flooded outboard starboard pontoons. The water is now expelled



4. FLOATING AGAIN, on the surface of the pond, the "Rand Navy," as the dredge was facetiously known in this desert region, is now ready to be put in condition for service

When Will We Mine Taconite?

For Northern furnaces, it appears to have economic advantages over imported high-grade ores, but situation may be altered if a deep waterway is constructed.

E. W. DAVIS, *Director, Mines Experiment Station, University of Minnesota*

THE ANSWER TO THE QUESTION posed in the title of this article is, "Whenever Northern steel companies which are short of ore reserves decide that sintered taconite concentrate will be competitive to other sources of blast-furnace feed." Their solutions to this problem will be conditioned by their analyses of the probable cost of high-grade foreign ores, delivered. At present, magnetic taconite is somewhat better than potentially competitive to foreign ores at Northern furnaces. Much of the steel company problem hinges on the possibility of a deep waterway to the Great Lakes and the date of its completion. If the steel company executive believes that such a waterway will be built before his present ore reserves are depleted, and that foreign production costs will remain low, he is likely to shy away from taconite concentration. If, on the other hand, he believes that such a waterway will not be in existence in time to meet his needs, or that other circumstances, such as uncertainty of delivery or high transportation costs, will damage the competitive position of foreign ores, then he is likely to start taconite production in the near future.

Because our reserves of high-grade ore are known to be limited, there has been considerable speculation as to methods and costs of taconite concentration, and several organizations are engaged in actual research. The problem is not one which concerns the War Production Board, as nobody doubts that our high-grade reserves are sufficient to see us through the present war. However, government policy is likely to affect the taconite problem profoundly. If, as a matter of national security, the government should decide to prevent the complete depletion of our high-grade reserves, then the necessity of making a choice between taconite and foreign sources of blast-furnace feed will become much more urgent and might force a precipitate conversion to new means of supply.

"TACONITE" is ferruginous chert, containing from 20 to 30 percent iron. It is a Mesabi Range term, referring to the low-grade protore from which, in places favorable to extraordinary circulation of underground water, silica has been leached to leave the higher grade "soft" ores characteristic of the Mesabi Range. Taconite is not thought to be an original deposit but is considered to be altered from cherty siderite or ferruginous silicates, such as greenalite, deposited as sub-aqueous sediments. "Magnetic taconite" has been produced where metamorphism has changed the hematite of ordinary taconite to magnetite, principally on the east end of the range. In both magnetic and ordinary taconite, fine grinding is necessary to permit separation of the iron minerals.

From the standpoint of the average reader, the term "taconite" should be considered to apply to any low-grade, fine-grained ferruginous chert from the Lake Superior region. All the iron ranges have similar protores, and solution of the concentration problem for Mesabi taconite would have similar applications to other ranges. However, as in the case of higher-grade ores, the Mesabi Range offers the greatest possibilities of large-scale open-pit operations. Therefore, it is reasonable to presume that most of the low-grade operations of the future will be on the Mesabi.

The Known Facts

First, let us establish a few facts that appear to be indisputable:

1. No informed person will deny that the amount of taconite available on the Mesabi Range is exceedingly large, or that high-grade concentrate can be made from it by processes that are already in commercial use.

2. Steel companies will get their future ore supplies wherever they can get them cheapest. Combined ore produc-

tion and transportation cost per ton of pig iron produced is the controlling factor.

3. Several of the steel companies are short of ore and are looking for new supplies. The fact that there still remains a half billion tons, more or less, of open-pit ore on the Mesabi Range, does not help the steel company that does not own it.

4. The greater proportion of the steel plants of this country were erected in their present locations because of

Table I. Proved Lake Superior Reserves and Smelting Capacities of Several Steel Companies
(Millions of Tons)

Steel Company	Lake Superior Ores			Total	Annual Requirements	Years of Life
	Open-Pit Direct	Underground Direct	Open-Pit Concentrate			
A	20	36	1	57	8	7
B	5	15	2	22	8	3
C	18	8	8	34	7	5
D	14	50	13	77	6	13
E	2	22	1	25	3	8
F	15	23	3	41	7	6
G	2	10	1	13	2½	5

the great Lake Superior iron-ore deposits. These plants are designed to use ore of the type now being shipped to them. The steel-making processes now in use must be changed and the plants redesigned if ores from other localities that are high in certain impurities, such as phosphorus, are to be used in quantity.

5. The amount of capital invested in steel plants dependent on ore from the Lake Superior region is enormous. Any steel company whose ore reserves will not last ten years is approaching financial difficulties.

Many Companies Short of Ore Reserves

In Table I there is shown a list of Northern steel companies, their proved Lake Superior ore reserves, and the smelting capacities of their blast furnaces that are dependent upon Lake ores. In the column to the right in this table is shown the approximate number of years that each of these companies can operate its furnaces at full capacity, using its present ore reserves.

From this table it is seen that even including all underground ore and open-pit concentrate, most of these companies have insufficient ore to keep all of their present equipment in operation for ten years. Even if these periods are increased by 50 percent to allow for new ore discoveries or to discount hidden reserves, several of these companies are getting dangerously short of ore. To offset this deficiency, some of them have acquired ore in New York, Canada, Cuba, and South America. Some have recently acquired great areas of Lake Superior taconite.

Taconite Costs

There is plenty of iron ore in the world, but, as has been pointed out, the important question is, "Where can it be obtained most cheaply?" This brings up the question of production

and transportation cost. For purposes of comparison, Table IV shows average costs for delivering to Lower Lake ports enough Minnesota ore to produce one ton of pig iron.

The figures shown have nothing to do with quoted Lake Erie ore prices, because most of the steel companies own the ores and in some instances own the railways and boats. Data to which reference is made are simply the costs of production at the mines plus transportation costs to Lower Lake ports. The cost of producing taconite concentrate is an average of the estimates made by experienced engineers for their own mining companies. It should be pointed out that, although taconite costs appear to be high, the agglomerated concentrate is a more desirable product and can be smelted more cheaply than much of the ore now being shipped.

Alternative Solutions

Now consider the problem before a steel company official charged with the duty of adding substantially to the rapidly dwindling ore reserves of his company. He must secure ore of the type his plant was designed to use, and must secure it from the cheapest source. He can buy small quantities of ore on the open market, but to maintain the standing of his company, he must secure a considerable reserve tonnage, say 50 million tons or more.

He naturally examines the Lake Superior region first, but finds that, at best, he can acquire only a few million tons of off-grade, substandard, high-cost ore in this area unless he can discover some large, new deposits. However, the whole Lake Superior region has been carefully explored, drilled, and prospected, and there is little hope of finding any large new ore deposits. He can acquire taconite lands if he wants them, but taconite concentrate will cost him nearly \$9 per ton of pig iron, whereas the ore he has been using has cost him between \$7 and \$8.

He next examines the Canadian deposits of the Lake Superior region. In the Steep Rock area, where new mining operations are just beginning, he finds that he might be able to develop some additional tonnage of new ore, but in all probability production cost will be nearly as high as for Mesabi taconite. Most of the remaining ore available in Canada is similar to taconite, but not so easily mined.

He next considers the ores in New York. He finds that the magnetite will require concentration methods similar to those used for the magnetic taconite of the Mesabi Range. Although the New York magnetites are higher in iron than the Mesabi magnetites, the cost of production and delivery will be about the same, because the New York ores must be mined by underground methods. The deposits that are still available are comparatively small, and he would have to locate them, if he could, by extensive prospecting and drilling. South of the magnetite areas, the Clinton ore forms a continuous band across nearly the whole State of New York. It exists in large quantities, but is low in iron, very high in phosphorus, and the ore seam averages less than two feet in thickness. Underground mining would be required for most of it, and production costs would be high. In addition to this, the high phosphorus content would prevent his plant from using much of it at any price.

The Black Band ore of Pennsylvania and Ohio is associated with the coal-bearing formations. This ore is a carbonate, and even after treatment contains 20 percent silica and is high in phosphorus. It was mined many years ago by underground methods. Production costs would undoubtedly be too high for the quality of ore produced to make this material of interest to Northern blast-furnace and steel-plant operators.

Considerable quantities of ore exist in the Birmingham district, but these contain only 35 or 40 percent iron and are mined by underground methods. Transportation cost alone removes this material from further consideration for use in Northern blast furnaces.

Ores of mediocre to poor grade exist in small deposits spread over large areas of Missouri, Texas, and the southeastern states, but production costs would be high and transportation costs would be prohibitive.

Overseas Possibilities

The steel executive next turns his attention to foreign ores. Large quantities of underground ore occur in Newfoundland. It is not of a quality that

Table II. Estimated Costs per Ton of Producing and Shipping Concentrate from Magnetic Taconite

Mining, concentrating, and sintering.....	\$3.00
Royalty, taxes, amortization, overhead, etc.....	1.00
Transportation to Lower Lake ports	1.91
	\$5.91

Table III. Estimated Direct Operating Costs of Mining and Concentrating Magnetic Taconite, per Ton

Labor.....	\$0.30
Power.....	0.40
Supplies.....	0.47
Total.....	\$1.17
Ratio of concentration.....	2.5:1

Table IV. Approximate Cost of Delivering Sufficient Minnesota Ore to Lower Lake Ports to Produce One Ton of Pig Iron

Open-pit direct-shipping ore and concentrate.....	\$7.00
Underground direct-shipping ore..	8.50
Magnetic taconite concentrate (estimated).....	8.80

can be used economically in his furnaces. In addition to this, there is no cheap way to transport it to his plants, at least not until a deep St. Lawrence waterway is constructed. This same statement is true for the ore in Labrador.

In Cuba large quantities of ore are known to exist, but this ore contains impurities that make steel production difficult. However, it may be of considerable importance in the future on account of the nickel and chromium contained. Transportation is the major problem, which is also true of the great deposits of high-grade ore that exist in South America. If his steel plant is to depend upon imported ores, it should be relocated near the seacoast, unless a deep waterway is built in the meantime.

Taconite Is Competitive

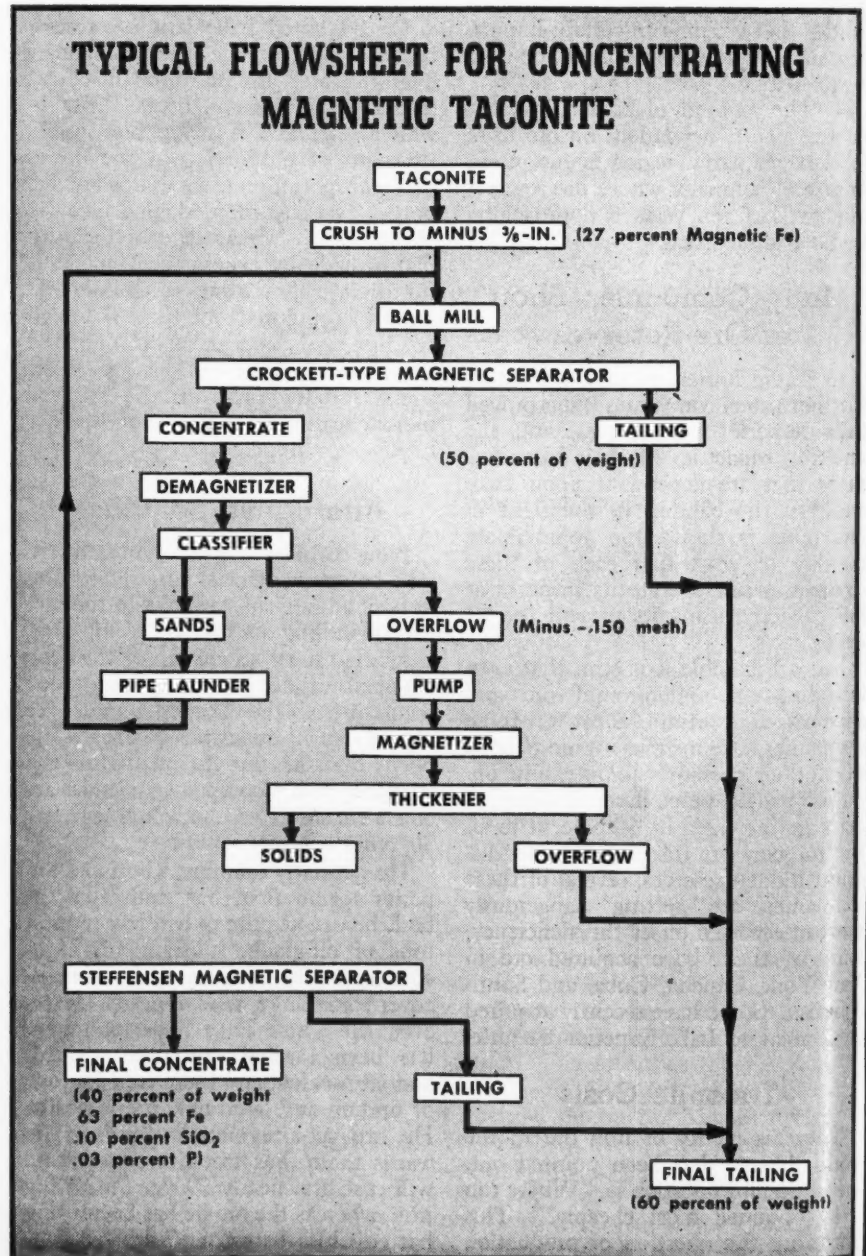
This completes the known large ore deposits, of any type, that can be considered for his Northern steel plant. From none of these can the steel com-

pany man secure ore at the cost that he has been paying for his Minnesota ore. He will probably find that he already owns large tonnages of protore surrounding his worked-out Lake Superior mines, from which he can concentrate his needs at a price competitive to other alternatives. By developing these resources he will also be free from complications due to foreign exchange fluctuations, possible oppressive acts by foreign governments, and possible separation of his sources of supply by warfare. Thus, even though he may decide to import a part of his needs, he is likely to want a finger in the taconite pie as a backlog for emergencies.

This story of an executive looking for ore for his Northern steel plant is actually not so visionary. The program

has actually been and is still being followed by some of the steel companies. Even Mesabi taconite that has not already been taken up is getting hard to find. No company has actually committed itself, as yet, to the use of Mesabi taconite, but this may happen at any time that some steel company becomes convinced that no cheaper supply of suitable ore is available.

It has been estimated that the South American ores can be delivered to Buffalo by railroad from Atlantic ports at a total cost of \$6.70 per ton (*E.&M.J.*, Jan., 1943, p. 58), which is about \$9.35 per ton of pig iron produced. Inasmuch as taconite concentrate can probably be delivered to Lower Lake ports at a cost of \$8.80 per ton of pig iron produced, it appears now that





MAGNETIC TACONITE, exposed in the Argo pit, at Babbitt, Minn., on the east end of the Mesabi Range. This property was first opened in 1918. In the 'twenties the lean magnetite from it was concentrated by magnetic separation and sintering to produce a high-grade bessemer ore. The operation was unprofitable at that time.

South American ore cannot yet compete on the Great Lakes. However, at inland furnaces, Lake ores carry an additional railway freight charge which would make the cost of sintered taconite concentrate delivered at these points more than \$10 per ton of pig iron produced. Because sintered taconite concentrate is cheaper to smelt than raw ore, competition may exist between taconite concentrate and South American ore delivered at inland furnaces.

Probable Rate of Consumption

Turning to the question of the future demand for steel, those who foresee a great decrease after the war in that demand visualize (1) a probable depression period, (2) an increase in the use of scrap iron, (3) an increase in the use of plastics, and (4) an increase in the use of aluminum and magnesium. These subjects will be discussed in order.

1. In a report recently made by a government agency, prepared after careful study by experts but not yet released for publication, the prediction is made that there will be a postwar demand for steel of at least 86 million tons per year and a more probable demand of 100 million tons or more. A well-known steel company economist in a private communication mentions 70 or 75 million tons. In 1942, by straining all of our facilities, we were able to produce only 86 million tons of steel. In that year Minnesota

shipped 75 million tons of ore, 70 million tons of which came from the Mesabi Range. According to the steel requirements predicted in the government report mentioned, Minnesota will be called upon for at least 75 million tons of ore annually after the war, and probably considerably more than this. Using the more conservative figures of the steel-company economist, Minnesota would be expected to produce over 60 million tons of ore annually.

2. It is claimed in some quarters that there is a growing tendency in steel making to replace pig iron, and therefore iron ore, with scrap iron. This was true until about ten years ago, but since that time the trend has been to use more ore and less scrap. In 1932, which was the low point, only 0.84 tons of ore was used per ton of steel produced, but since that time the ratio has gradually increased to about 1.1 tons of ore per ton of steel in 1940. There seems to be a tendency to use more scrap when steel production is low and more ore when steel production is high. If the postwar planning agencies are right, we are going to need every pound of scrap we can get to maintain steel production at required levels after the war, because we can produce only about 60 million tons of new metal annually in existing blast furnaces.

3. Plastics are of growing importance for certain uses, but there is far more likelihood that plastics will replace the more expensive metals than steel. The properties of plastics would

not permit their replacing steel in most of its uses. Also, the entire output of plastics is a trifle compared with the tonnage of steel used.

4. By the time the war ends, this country may have a magnesium and aluminum industry capable of producing a million and a half tons of these light metals annually. These metals could, on account of their lighter weights, replace three million tons of steel. However, it is unlikely that all of this capacity can survive or that all of what does survive will replace steel. It has been the experience in the past that the introduction of a new product increases, rather than decreases, the use of the older one. We use more wood nowadays than was utilized before the time of large steel production.

Present Status of Taconite Problem

Technically, everything possible is being done. Engineers on the ranges, at the universities, in the Bureau of Mines, at Battelle Institute, and at other laboratories are working on the problem of taconite concentration. A complete survey of the range district is now being made by the Minnesota Division of Water Resources in order to locate adequate water supplies, because taconite concentration will require great quantities of water. A preliminary study has been made by the Iron Range Resources and Rehabilitation Department of the possibility of pumping the fine taconite concentrates from the range to the lake, because transportation is one of the large items of expense. The possibility of reducing the cost of electric power is being investigated because taconite plants will use about 70 kw.-hr. per ton of concentrate produced, which, if calculated at present power rates, will cost approximately \$1.

The people of the Mesabi Range have already done the most important thing they can do. They have evinced their desire to cooperate by freely surrendering practically all of their rights to tax the taconite industry. This recognition of the fact that the payroll dollar is more important than the tax dollar is of the greatest importance. If a large steel company builds a 25 million dollar taconite plant in the Iron Country, the friendly, appreciative, cooperative attitude of the local communities is of the greatest importance. In fact it is quite likely that the crucial factor in the decision whether to use taconite concentrate or to employ imported ore will be the steel executive's opinion on the State and local tax outlook.

How to Make Better Core-Drill Records

CHARLES A. DOBBEL, *Associate Professor of Mining, Stanford University, Palo Alto, Calif.*

MILLIONS OF DOLLARS have gone into core drilling to represent hundreds of thousands of feet of exploration which is of no use to the mineral industry today because of inadequate or incorrect records. Every foot and every dollar's worth of this work was of some value, on the basis of assays, when the actual drilling was done, mainly because a hole passed through ore or disapproved ground in some particular area, but if the core carried any other message in the way of unrecognized guides to ore, that message was overlooked. Core, in many drilling operations, served its immediate purpose and was forgotten or discarded. In others the core was carefully stored for some years until space for new core was demanded or space was needed for other purposes. In at least one instance known to me the core from drilling was laid out on the surface, next to the hole being drilled. It was examined, described, and then allowed to scatter and roll away without thought of what posterity might do with new fashions in ore-finding geology. If this core were available today, or if even a clear and accurate description of it were available, some guide to present needed strategic minerals might be had with but a small investment.

Clear Terminology Essential

Will not records answer? Certainly—but just how good is a description of a piece of rock? Every individual has his own terminology. With the passing of time, the vogue of particular rock terms changes. Guides to ore develop as information on a district progresses. It is doubtful whether any of us would describe a piece of core today in the same terms we would have used some twenty years ago.

Waste-filling in the stopes of yesterday is in many properties ore of today. Perhaps, if we can reach some measure of improvement in records we can relieve the next period of hunger for certain minerals by leaving behind a more definite guide to a mineral which we do not now recognize as of economic importance. In doing this, it is important that our terminology be clear.

It must carry through the years so that our terms will be known to our successors.

An interesting example of terminology change may be cited as a demonstration that only one season was necessary to bring about a difference in rock description:

In 1941 a new district was being drilled for copper and molybdenum. One of the rocks carrying values was a coarse-grained granodiorite with an ample scattering of ferromagnesian minerals which made it a darker-appearing rock than the so-called normal rock in the area. The amount of ferromagnesian minerals in this rock was taken as a guide to possible areas of better ore. At the start of the season the term "coarse-grained mela-granodiorite" was applied to core descriptions showing this phase of the rock, and these areas were assumed to be those in which mineralization of value might be most reasonably expected to occur. As the drilling progressed through the season, a new type of rock was encountered in the peripheral areas of the deposit. This was also a coarse-grained granodiorite, but the ferromagnesian minerals existed in much larger phenocrysts. Certainly the term "coarse-grained mela-granodiorite" would definitely fit this rock, and yet the important fact was that this latter rock carried no mineralization whatever. If drilling had stopped in 1941 before this new rock was found, and a later season's work happened to start in this type of rock, with a new crew, certainly the term of "coarse-grained mela-granodiorite" would have been misleading to say the least without more detailed description as to what was meant by the term.

Another example may be cited with the term "highly sericitized." Sericitization is a guide to mineralization in many deposits. The degree of such alteration can be used to call attention to likely areas for ore, but until a standard is established as to what is meant by the word "highly," the word "moderate," or the word "lightly," there is no quantitative value to the rock description used in describing a certain exploration.

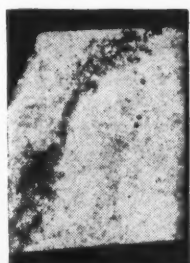
Such terms as "quartz-rich," "lightly chloritized," "highly mineralized," or "slightly altered" all call for some measure of quantitative standard if those who follow are to read a description of today and know what was meant in the records of a core-drilling exploration. In an area where gradations of a rock from a light phase to a dark phase is to be observed, a set of terms using "leuco," "normal," and "mela" can well cover today's description, but cannot posterity well ask: "Just what did John Doe mean by 'leuco-granodiorite'?"

Geological Standards Needed

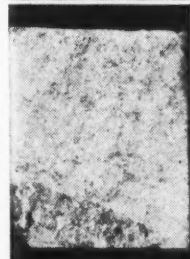
We can hire the best geological talent to record and describe the results of a core-drilling program, but until we have a definite standard with which to measure terminology, or until we can reduce the geologist's description to every-day, understandable English, it is difficult to read the description of a set of drill cores and experience much interest in the great amount of work such a description represents.

Terminology in these applications is complex. We can find terms that were never dreamed of in the compilation of Kemp's Glossary—and, to be frank, that was my source of being as smart as the newer graduate years after I finished my study of mineralogy.

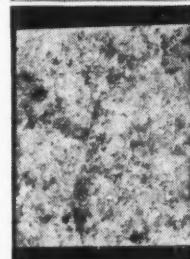
To be sure, the record written by the driller himself is worthless from a scientific or ore-finding criteria standpoint. The average driller has about six words in his vocabulary to describe any formation through which he drills. One of these is "granite," another is "clay," another is "boulders." "Clay" may often mean clay, but it more often means fault gouge—important to the structure of a district, but only as trouble and an excuse for less footage on the driller's daily report. "Granite" can mean anything that is solid, hard rock. "Aufintus," or whoever it was that they called the great god of minerals, could well tear his hair at the terminology used by the diamond driller, but some of this homely description is just as valuable as those long, complex descriptions which bury



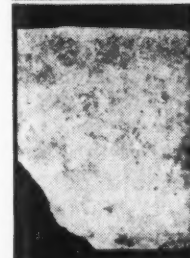
At 298 ft.: Tourmaline vein with pyrite in normal granodiorite



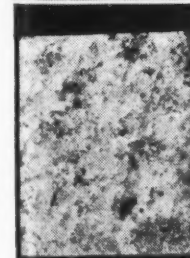
At 292 ft.: Pyrite seam in sericitized leuco-granodiorite. This part of hole lacks ferromagnesian minerals



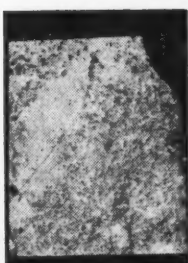
220 to 365 ft.: Type of granodiorite from 220 to 365 ft. Variations are local



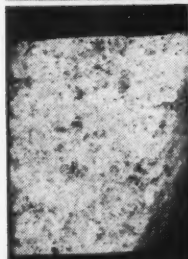
At 360 ft.: Granodiorite, MoS₂ and chalcopyrite mineralization



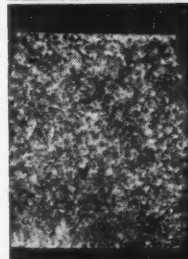
369 to 370 ft.: Normal granodiorite



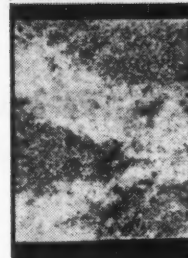
379 to 381 ft.: Fine-grained mela-granodiorite. Note finer grain structure. Ferromagnesian minerals are finer and more dispersed through the rock



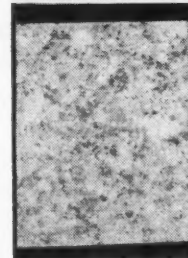
391 to 403 ft.: Fine-grained mela-granodiorite



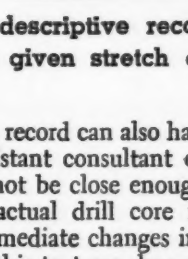
381 to 382 ft.: Leuco-granodiorite



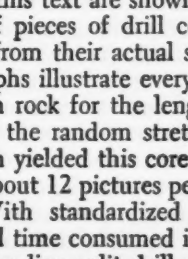
403 to 406 ft.: Normal granodiorite with fine-grained ferromagnesian minerals



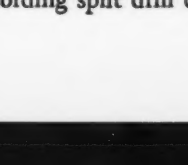
382 to 386 ft.: Fine-grained mela-granodiorite



406 to 407 ft.: Mela-granodiorite



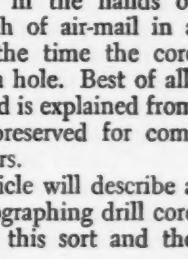
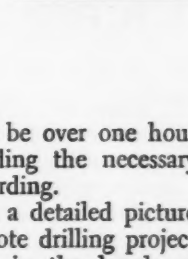
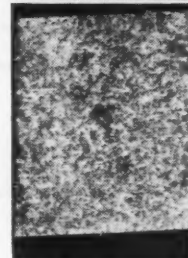
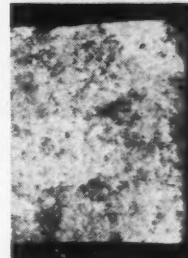
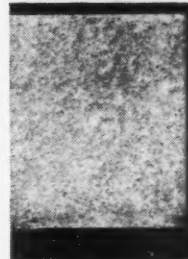
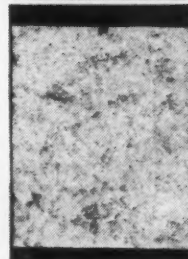
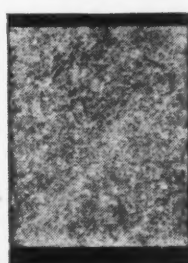
At 386 ft.: Band of quartz-rich normal granodiorite in fine-grained mela-granodiorite



407 to 411 ft.: Normal granodiorite

386 to 391 ft.: Fine-grained normal granodiorite

411 to 420 ft.: Fine-grained mela-granodiorite with pyrite streaks



Photographic and descriptive record of the important rock changes in a given stretch of diamond-drill core

the mine operator's interest with vagueness or misunderstanding.

Herewith is an idea set forth to compromise the drill record situation: A random hole has been selected and the changes in core have been noted from a certain length of the split core sent to storage. The procedure is simple, its cost is negligible, and yet the description of changes from phase to phase or rock to rock is definitely recorded, picturing the actual changes in granular texture, color, mineralization, and other characteristics, offering some standard by which to judge the written description.

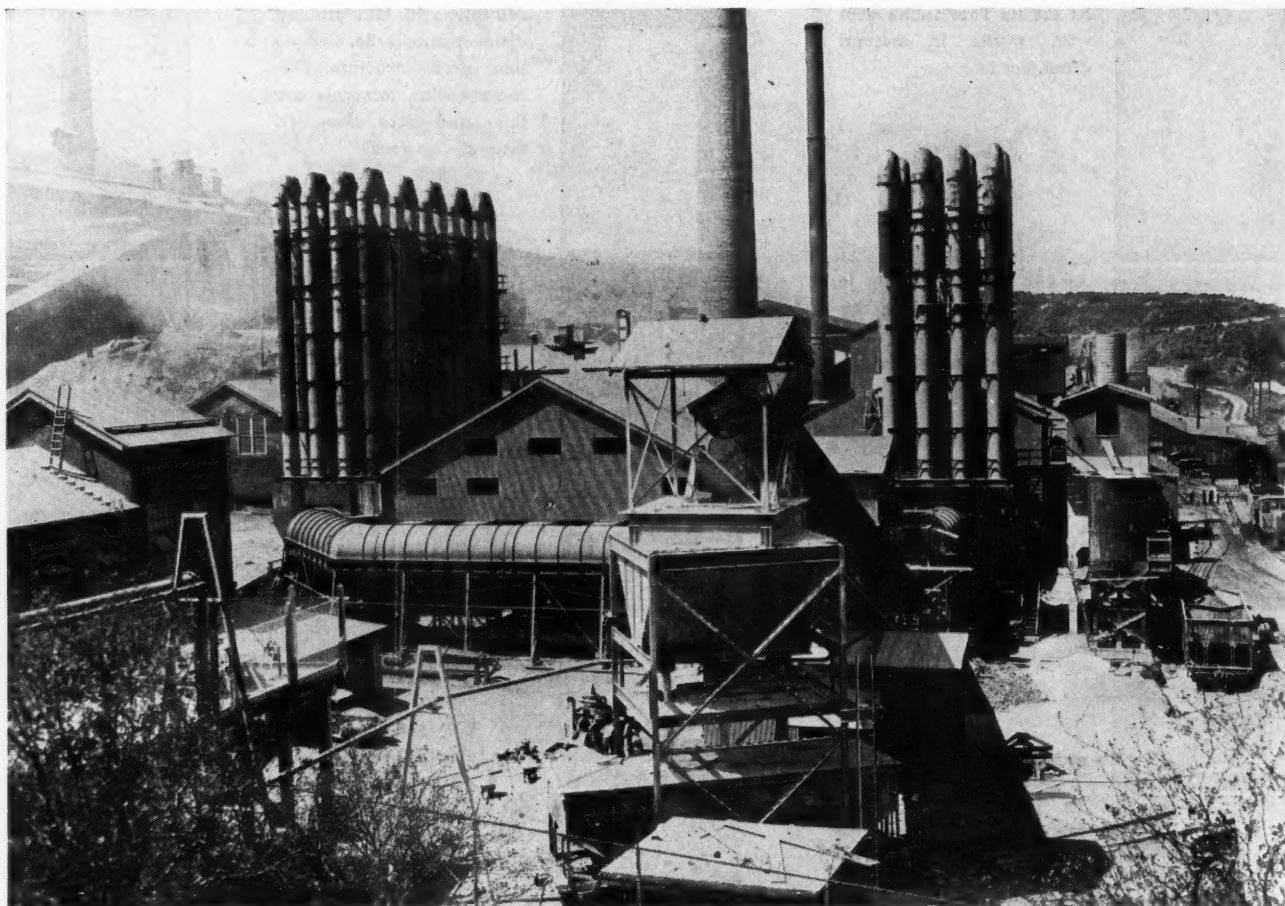
Such a record can also have its value to the distant consultant or geologist who cannot be close enough to examine the actual drill core in time to direct immediate changes in plan.

With this text are shown 15 photographs of pieces of drill core slightly reduced from their actual size. These photographs illustrate every important change in rock for the length of hole taken on the random stretch of drilling which yielded this core. This represents about 12 pictures per 100 ft. of hole. With standardized procedure, the actual time consumed in the process of recording split drill core in this

manner would not be over one hour per 100 ft., including the necessary processing and recording.

This means that a detailed picture of just what a remote drilling project is doing could be in the hands of anyone within reach of air-mail in a day or two from the time the core barrel comes from a hole. Best of all, the terminology used is explained from that day on and preserved for comparison in later years.

A subsequent article will describe a procedure for photographing drill core to give pictures of this sort and the apparatus required.



BUNKER HILL'S NEW ZINC-FUMING PLANT at Kellogg, Idaho, as it appears at the east end of the lead smelter with its flues, baghouses, and cooling towers. Heart of the process is accurate automatic control

Automatic Control Features Zinc-Fuming Plant

B. H. HODGINS, Manager, Westinghouse Electric & Manufacturing Co., Spokane, Wash.

FEATURES OF ADVANCE DESIGN which include completely coordinated automatic electrical control are no doubt responsible to some extent for the outstanding success of the new zinc-fuming plant at the smelter of the Bunker Hill & Sullivan Mining & Concentrating Co., at Kellogg, Idaho. In support of this statement may be cited the fact that the first test run lasted 28 days without a hitch in operation, after which the plant was shut down briefly for inspection.

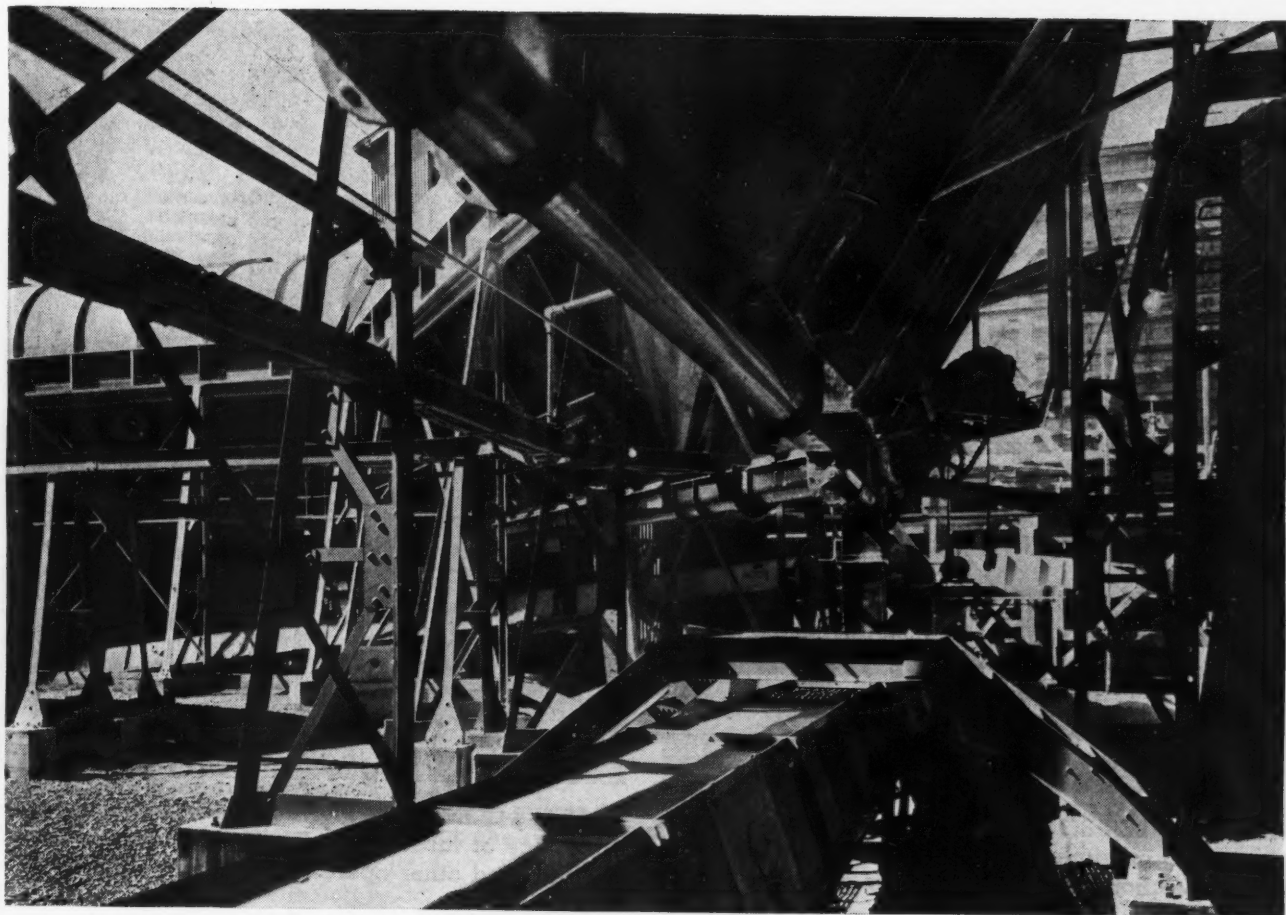
Designed to permit recovery of zinc both from current operations and from waste dumps, the plant is served electrically from a central substation situ-

ated near the center of the load. This building contains the 2,200- and 440-v. switchgear, the three-phase air-cooled power transformer, the metering equipment, and all 2,220-v. and 440-v. motor starters and air circuit breakers.

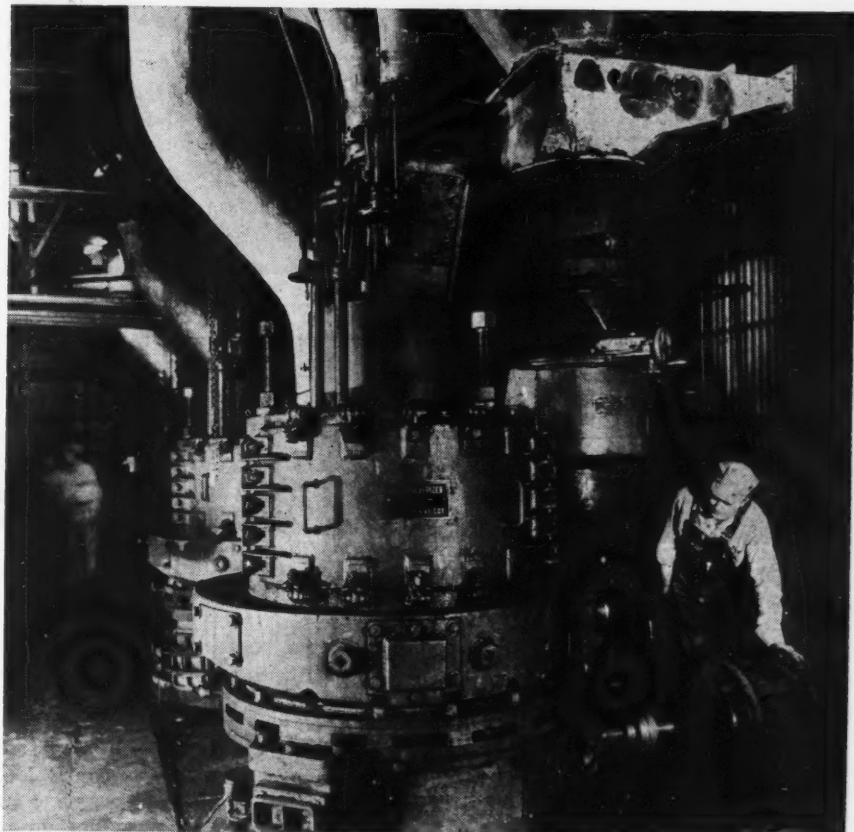
The centralized location of the substation made possible the coordination of all electrical starting functions and interlocking at a readily accessible point for most satisfactory maintenance. It also permitted the assembling of all the 440-v. motor starters—114 of them—with their individual air circuit breakers, in two compact metal-clad units, all built and furnished by Westinghouse with the interlocking

circuits completely installed. In this manner, a large amount of installation time was saved, evidenced by the fact that there are 73 interlocked motor circuits in seven series and parallel conveyor groups. Of the seven groups, the largest comprises 39 interlocked motor controllers, and is itself broken down into six subseries.

The automatic "brain" of the plant is in a dust-tight central control room near the fuming furnace. The usual boiler-room indicating and recording instruments, as well as the automatic-control instruments for pressure and flow of steam and the various air supplies, are mounted in and on a control



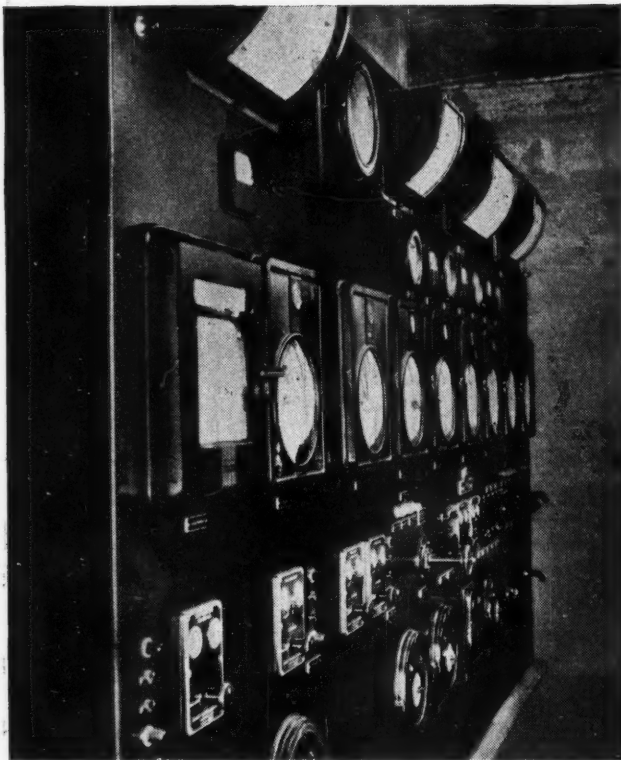
A SCREW CONVEYOR discharging on to the belt conveyor underneath is provided at the bottom of each section of the flue for dust collection. Every conveyor in the plant is driven by a gearmotor. All gearmotors are controlled by Westinghouse control centers shown in an accompanying picture. The units are interlocked so that if one shuts down all stop



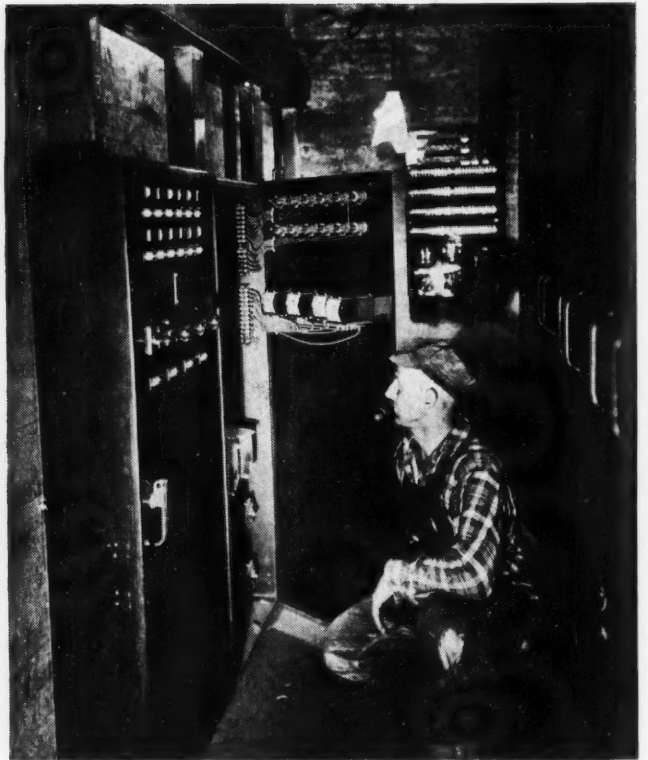
FOR THE COAL PULVERIZERS protection and automatic control of air pressure and flow are provided. Coal is fed under variable pressures depending upon depth of slag bath in fuming furnace

board built by the Bailey Meter Co. Coordinated with these controls and in the same room are three Westinghouse control cabinets containing electric relay and control circuits, which are also designed and built at Seattle. Indicating lights, electrical circuit-control and transfer switches, and ammeters for the drives are on the Bailey board.

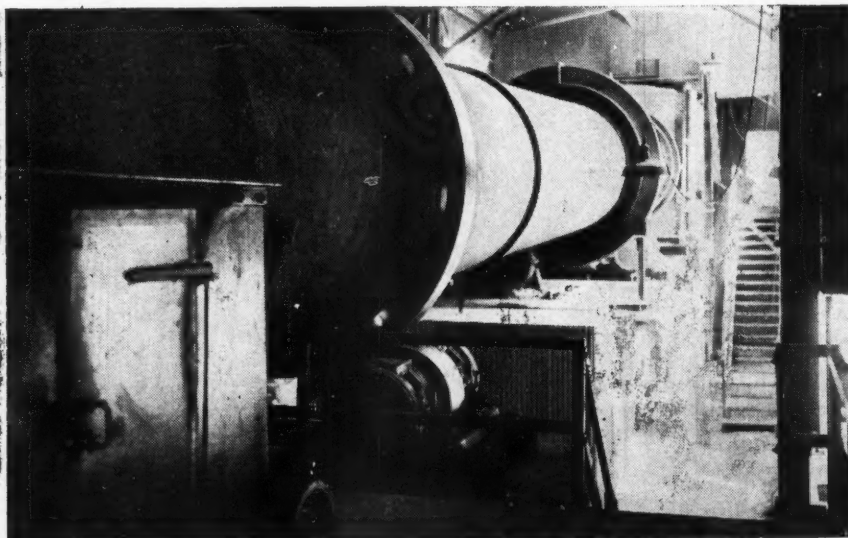
Protection and automatic control of the air pressure and flow are provided for the various coal pulverizers. Coal is fed directly to the tuyeres under variable pressures, depending upon the depth of slag bath in the fuming furnace. For greater efficiency and reliability, such items as the hood draft damper of the deleading kiln, the uptake damper, the secondary air dampers to the fuming furnace, coal feed to the pulverizers, and speed of the bag-



MAIN BOILER BOARD has the usual indicating and recording instruments, plus automatic control instruments for both pressure and flow of steam and air



MASTER-CONTROL PANELS coordinate the performance of furnace, coal feeders, pulverizers, draft control, and other operations in the fuming plant



DRAFT of the 75-ft.-long deleading kiln is controlled automatically

house draft turbine are all controlled automatically, based on furnace conditions. Result of these automatically coordinated controls has been a minimum of time and material lost due to misoperation, and maximum efficiency has been obtained in the reduction of the zinc, effecting the maximum zinc elimination from the slag.

Automatic electrical control of the coal feed bins is part of the function of the relay-control cabinets, which are in

the central control room. With this equipment, a supply of coal under air pressure equivalent to that at the furnace tuyeres is constantly available to the pulverizers. Each of the coal bins is equipped with an air-pressure lock compartment and a main storage compartment. Pressure and mechanical limit switches, which control electro-pneumatic coal flow gate valves and air pressure valves operate in sequence to fill the bins in a repeating cycle.

The supply of coal from the bins to the pulverizers is maintained automatically by Bailey feeder controllers which operate on a differential principle of air-pressure drop in the pulverizer to control electrically a two-speed feeder motor in the "off," "low," or "high" speed conditions. The electrical components of this control are incorporated in the general automatic control system, with the feeder controller and circuit transfer switches being built into the Bailey board and the associated control relays and motor controllers in the Westinghouse relay cabinets and motor-control units.

Throughout in these automatic operations, all important control circuits have been so arranged and grouped that master selector switches can be turned to block operation, or transfer from manual to automatic operation. The electric circuit arrangement is such that by the installation of automatic time-cycle controllers, now on hand, the entire fuming-furnace cycle and the boiler starting and stopping cycle can be made fully automatic.

Many of the plant functions were entirely new as applied to fuming operations. These problems were solved by the close cooperation of the engineers of the Bunker Hill company and of the consulting engineer, H. W. Beecher, with those of the companies that supplied the equipment.

Pipeline Ore Transport May Lower Mining Cost

C. ERB WUENSCH, Consulting Engineer, San Francisco, California.

DURING MY EARLY WORK in the use of heavy "sink-and float" suspensions for the concentration of ores, I attempted to convey in pipelines crushed ores suspended in the natural ore slimes. These experiments failed because of the high velocity of flow required to convey the ore, and because the loaded line would clog if a shutdown became necessary.

Not until the development of magnetic media for use in differential density separations did a practical solution to this problem become apparent. It was discovered that certain magnetites, artificially prepared magnetic substances, and attrition iron from ball-mill circuits, possess, when magnetized, the unique property of forming suspensions that do not pack. Used in transporting ores, these media could be simply and completely recovered and separated from the ore slimes for re-use.

Although much work remains to be done to apply commercially the above-mentioned principles, the work has advanced far enough to indicate the practicability of pipeline transportation of ores. The technique involved is only a combination of that used in drilling oil wells with "drilling muds," and of medium recovery methods now operating in "sink-and-float" plants using magnetic media. In the transportation of ores, more viscous media would be used: (1), to facilitate suspending the heavier ore particles at low velocities; (2), to minimize abrasion; and (3), to avoid segregation of ore particles in the line in case of a shutdown.

It would also be simple to combine pipeline transportation with concentration of ores by "sink-and-float" where the ores are amenable to this type of treatment.

Technique

The ore is crushed to minus 3 in. or finer and introduced into a conical-shaped hopper in which a part of the medium is recirculated to facilitate feeding the ore-medium mixture into the piston-diaphragm pumping unit. Ore crushed to this size has approximately 40 percent void space; therefore

★—————★
AN ENTIRELY NEW RANGE OF COST-REDUCING POSSIBILITIES is opened to the mining industry by the scheme of ore transport proposed by Mr. Wuensch, if it can be applied commercially. As an example of how pipeline transportation might be used, he has also suggested the following: In a certain underground mine, broken ore could be crushed underground to about 3-in. size, and then concentrated by a differential density process to yield a rough concentrate and a coarse barren tailing that would be used immediately for stope filling. The concentrate, either in the medium in which it was produced or in a new one, would be pumped directly up out of the mine to the mill's secondary crushing and grinding plants.

The saving in cost resulting from the successful application of such a method might equal dollars per ton of ore rather than cents. Mining, hoisting, crushing, and grinding costs, among them the biggest items of a mining company's expense, all would be lowered, if the plan could be made to work. *E.&M.J.* submits that the problem of making it work on a commercial scale should be given serious consideration by all progressive mining engineers, if for no other reason than that the possible cost savings inherent in Mr. Wuensch's scheme are so great.

★—————★
the ore-medium mixture will contain about equal volumetric proportions of crushed ore and medium. One ton of an average type of crushed ore of a mean specific gravity of 3.0 would be equivalent to 10.7 cu.ft., or 80 gal. Therefore, it would be necessary to pump twice this volume, or 160 g.p.m., of the ore-medium mixture to transport one ton of ore per minute.

When the ore-medium mixture reaches its destination, it is demagnetized by passing it through an alternating-current field. This defloculates the magnetic constituent. It is then passed over a vibrating screen that includes a coarse scalping screen and about a $\frac{1}{2}$ -in. lower-deck cloth. Excess medium drains from the ore on the first few feet of the screen and on the next few feet spray water is added to wash off the remainder of the

medium. Since the magnetic medium will all pass a 100-mesh screen, its removal is complete.

The plus- $\frac{1}{2}$ -in. ore is then conveyed to an appropriate storage space. Minus- $\frac{1}{2}$ -in. material is sent to a classifying cone with an automatically controlled sand draw-off. The peripheral weir overflow, containing the bulk of the slimes, is then passed through a direct-current magnetizing field and sent to a special differential flocculating cone. In this cone the greater part of the magnetic medium is recovered and sufficiently separated from the ore slimes to be sent to the medium storage tank for re-use. Overflow of this cone, which contains some magnetic material with the ore slimes, goes to a magnetic separator of special design, where the magnetic slimes are recovered. These are pumped to the

medium storage tank for re-use and the non-magnetic ore slimes are sent to a thickener. The overflow is used for the initial washing sprays, thereby closing the circuit. Thickened ore-slimes are stored in the thickener or removed continuously for subsequent treatment or other means of disposal.

The sand draw-off product from the initial classifying cone, which contains some ore and magnetic slimes, is sent to a spiral classifier screen of special design containing an 80-mesh screen cloth. The plus-80-mesh ore oversize

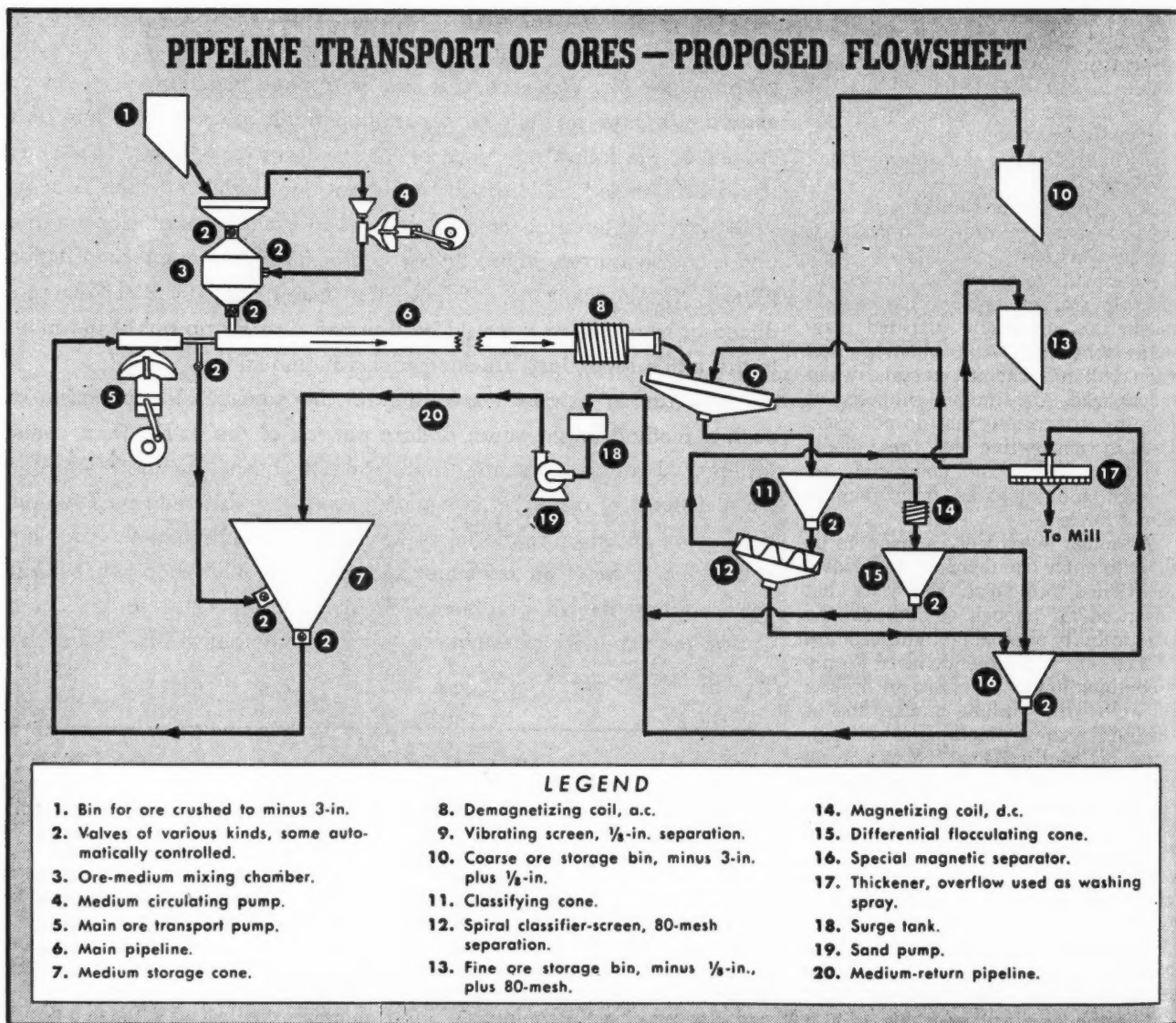
(minus- $\frac{1}{8}$ -in. plus-80 mesh) is sent to a suitable storage for subsequent utilization. This is absolutely free of magnetic material. The minus-80-mesh undersize, containing both ore and magnetic slimes, is sent to the magnetic separator referred to in the foregoing to join the other products of the magnetic separator.

Thus the three sizes of ore products are available for further treatment completely separated from the magnetic material. The magnetized magnetic material is recirculated from the stor-

age tank to transport additional crushed ore. The return medium can be recirculated intermittently by reversing the flow in the pipeline, or it can be returned to the initial pumping unit in a separate pipeline.

About 0.5 lb. makeup magnetic material per ton of ore transported is required. At \$10 per ton, this would be 0.25¢ per ton of ore transported.

Table I indicates the capacities, power requirements, and velocities of flow in pumping ore through various sizes of pipelines.



PIPELINE TRANSPORT MATERIALS, EQUIPMENT, AND COSTS

By varying the velocity of flow up to about 6 ft. per second, approximate interpolations of capacities can be made.

Table II indicates the approximate initial requirements of magnetite for various sizes of pipelines per 1,000 ft.

The medium will contain about equal volumes of magnetite and water. Four types of pipelines are available: rubber-lined steel pipe; wood-lined steel pipe; wooden pipe of special design, composed of two or more layers of wood; and transite (asbestos

cement) lined pipe. Much work needs to be done to determine the best type of pipeline and its design. Rubber, except for its initial cost, should prove to be the most practical. However, wood-lined pipe might prove about as suitable because of the fact

Table I. Capacities, Power Requirements, and Velocities of Flow for Various Sizes of Pipelines

Diam. of Pipe	Gal. Ore-Medium Mixture Per Min.	Tons of Ore Per Hour With Sp. Gr. of			Velocity of Flow, Ft. Sec.	Hp. Per 1,000 Ft. Head Per Mile, Sp. Gr.		
		3	4	5		3	4	5
4	80	30	40	50	2.0	70	82	95
6	160	60	80	100	1.8	125	145	168
8	320	120	160	200	2.0	242	285	328

that the magnetic media impregnate the pores of the wood, thereby lubricating the line and greatly minimizing abrasion. This is analogous to the well-recognized "wall-building" properties of drilling muds used in drilling oil wells.

Much work also remains to be done in the design of the pipelines to prevent excessive velocities in the downhill sections, and to minimize air-hammer. In some instances there is the possibility of regenerating power. I am aware of these difficulties, but, despite them, the fundamentals of the method described are sound and the

potentialities of this type of transportation are so attractive that they justify the effort towards commercial-

Table II. Magnetite Required for Various Sizes of Pipe Lines Per 1,000 Ft. of Line

Size of Pipe	Tons of Magnetite	Equivalent Cu. Ft. Ore-Medium Mixture
4	3.5	88.8
6	7.8	200.0
8	13.6	346.0

APPLICATIONS FOR PIPELINE TRANSPORT OF ORES

Elevating Crushed Ores From Mines Through Drill Holes

In this application expensive hoists and multi-compartment shafts and their costly upkeep for high-speed hoisting would be eliminated. Only the less costly shafts sufficient for men and supplies would be needed. Underground haulage costs might be greatly reduced because new drill holes and auxiliary crushing plants could be established in various points in the mine. Peak loads and power requirements would be reduced. No shaft pockets or surface hoppers for the storage of ore would be needed. The ore as it emerged from the drill hole at the surface could be transported in pipelines to the mill or waste dump.

One disadvantage would be the necessity of crushing waste from development in instances where it could not be used underground for filling.

Moving Ores Through Crushing Steps in Mills

The ore as it is transported to the mill from the mine could be pumped through the successive stages of crushing right up to the ball-mill grinding circuit before passing the ore-medium mixture through the medium recovery-purification circuit. Such a method of

conveying ore through a mill opens up many possibilities. Costly conveyors and bucket elevators and intervening storage bins would be eliminated. The whole mill structure would be made more compact. Crushing costs might be reduced because the film of magnetic mud surrounding each ore particle should lubricate the ore and crushing surfaces to minimize abrasion. The heavy media might also act as a vehicle to increase capacity of the crushing units.

Surface Transportation of Crushed Ores

This application has been previously covered, and only a few additional features need emphasis. In general the distance would be much less than present installations, except on a level terrain, because the pipeline would be a direct line. In most mountainous regions, the mines are situated at higher elevation than the railroad shipping point, so that intermediate pumping stations would have relatively low heads to pump against. Only the return medium would have to be pumped against the higher heads. In the event of a prolonged shutdown or a shutdown for repairs, the line would have to be flushed out with water.

In extremely cold climates the pipe-

ization. Fully to discuss these phases would be beyond the scope of these preliminary notes.

Cost of the medium recovery and purification plant would be about \$20 per ton-day capacity and the operating cost about 2.0¢ per ton. Cost of the pipelines will vary from \$3 to \$5 for a 4-in. line to \$6 to \$10 for an 8-in. line, the first figure being for wooden- or transite-, and the latter for rubber-lined pipelines. Obviously these costs will vary widely with the thickness of the steel shell of the pipe, with locality, and many other factors. In general it would appear that the complete pipeline transportation equipment and lines should cost from 50 to 75 percent less than belt conveyors. They would compare favorably with aerial tramways, and the operating costs would be considerably lower.

Compared to truck transportation and surface haulage systems, the capital costs would be much less. Furthermore, the operating costs should also be markedly less. The attractiveness of a continuous flow as compared to intermittent transportation of crushed ore is obvious.

line would have to be housed in a box containing electric lamps or other heating elements. These would be used in most instances only in case of a shutdown.

Pipeline Transportation vs. Shasta Dam Conveyor Belt

In conclusion, a tentative comparison of pipeline transportation with the famous Kaiser conveyor belt installation at Shasta Dam might be of interest. In the August, 1943, issue of *Fortune* it is stated that this installation was 9.6 miles long, cost \$1,100,000, that the operating costs were 18¢ per ton, and that 12,000,000 tons of sand and gravel were conveyed in three and one-half years. From this fragmentary data Table III is interpolated and compared with pipeline transportation.

Table III

	Shasta Dam	
	Conveyor	Pipeline
Length, miles	9.6	8.0
Cost per foot	\$21.80	\$12.00
Tons per hour	400	400
Power, hp.	?	1,500
Cost per ton	\$0.18	\$0.08
Cost per ton-mile	\$0.0188	\$0.010

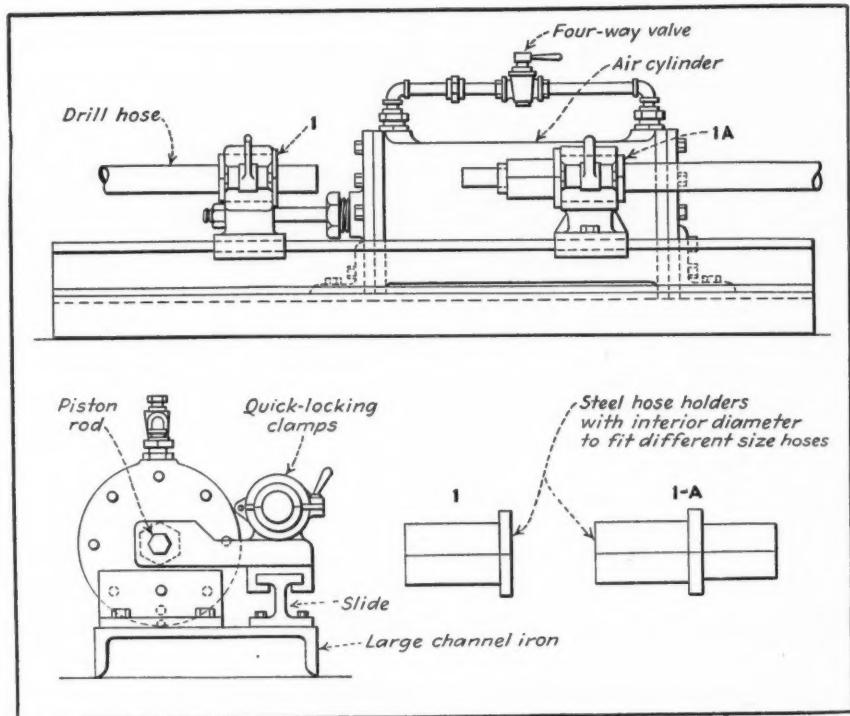
OPERATING IDEAS

Mechanical Drill Hose Assembler

A PIECE OF EQUIPMENT that has given valuable service at the drill repair shop at the Junction shaft of the Copper Queen Branch, Phelps Dodge Corp., Lowell, Ariz., is the mechanical drill hose assembler explained in detail in the accompanying sketch. It was developed by John Kratz, foreman, when he found assembly of drill hoses by hand slow, tedious, and unsafe. The force required to press a pipe nipple into the end of one length of hose and then push the end of the second length of hose over it, thus making one unit, is well known, as is the length of time required to complete the operation. With the machine shown, this job is a matter of seconds.

The device, made entirely of scrap material, consists essentially of a steel base made from a short length of large-size channel iron, an air cylinder controlled by a four-way valve, a T-shaped slide, and two movable supports with welded-on quick-locking clamps, one of which is attached to the piston rod by a steel crosspiece.

Operation is simple. Both ends of the hoses to be united are placed in the clamps containing the proper split steel holder 1 and 1-A after the free support has been set at the desired point, the clamps closed, and the pis-



ton-operated support slowly advanced toward the set support. As soon as the hose ends meet, the clamps are opened and the new hose length is removed. The same procedure is applied in dis-

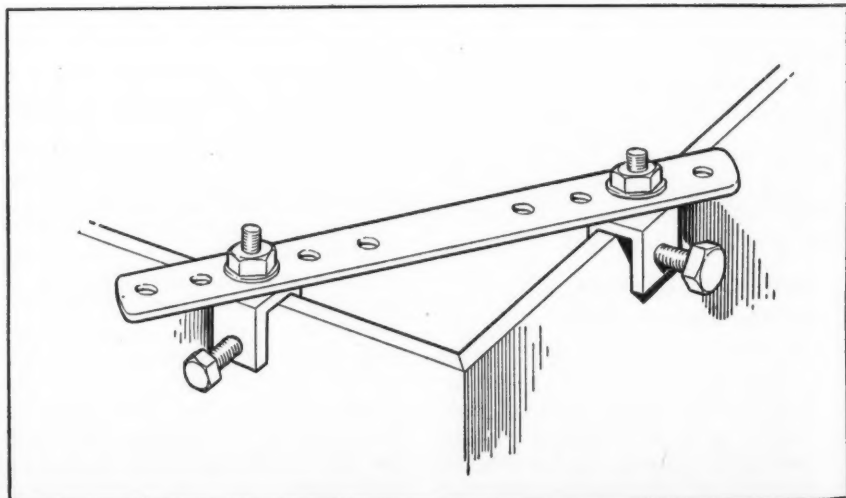
connecting hose lengths requiring a new joint, except that the piston-operated support is moved in the opposite direction and the joint is broken without the customary struggle.

Corner Clamp Aids in Welded Construction

TO FACILITATE the assembling of plates for welding, soldering, or drilling, Charles H. Willey, Penacook, N. H., suggests the corner clamp shown in the accompanying sketch. The device consists of a bar in which a series of holes is drilled and to which are attached two small U-clamps with integral studs and heavy serrated washers under the nuts.

As indicated, the clamp can hold two abutting plates together at any desired angle, and several of the clamps are a valuable asset to any assembler, erector, or repairman, according to Mr. Willey.

The soundness of this advice will be at once appreciated by anyone who has tried to work without such clamps.



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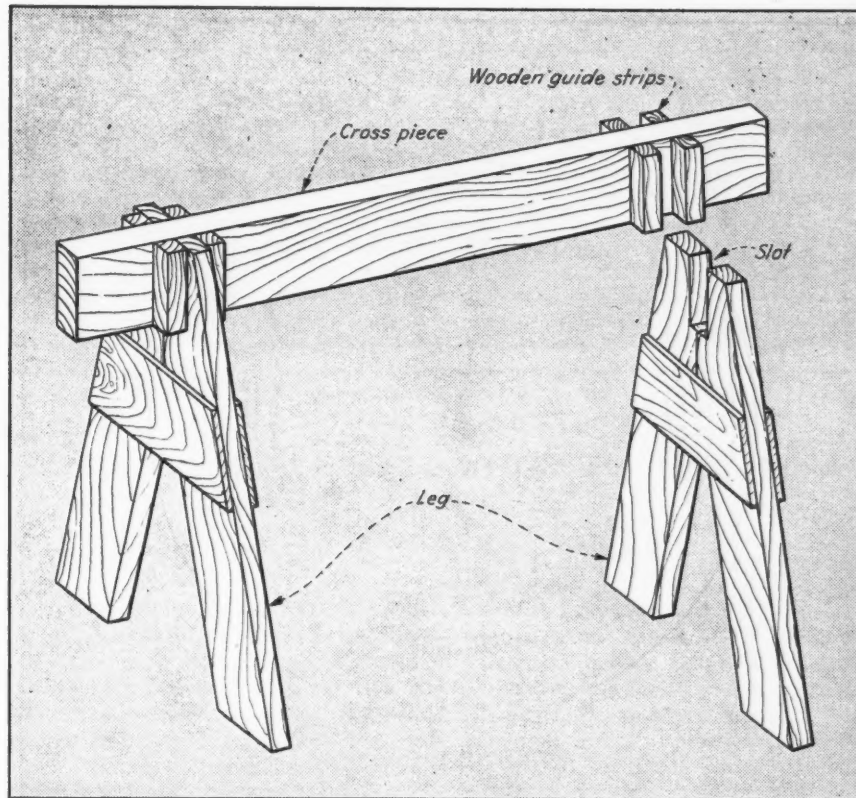
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A Handy Shop Trestle

A MUCH USED piece of auxiliary equipment found in every mine, mill, and smelter repair shop is the carpenter's horse or trestle. If of conventional design, it consists of two legs and a cross-piece or bar held rigidly together by through-bolts or large nails, or by welding if of steel construction. The only adverse feature found in this type of trestle is the fact that it is difficult to store when not in use, and will not withstand rough handling.

A trestle that has been found most satisfactory and one that can be readily dismantled and stored in a small place without danger of breakage is shown in the accompanying sketch. As will be seen, the top bar is provided with grooves at each end formed by nailing square strips of wood on each side to a bare clearance for the upper ends of the legs. The legs in turn are framed with a slot at the top, which is a close fit for the top bar. Assembly of the legs and bar is a matter of seconds. The bar is simply slipped into the grooves of the legs, and the trestle is ready for use. Obviously, the unit described can also be made from light steel bars and angle or channel irons.

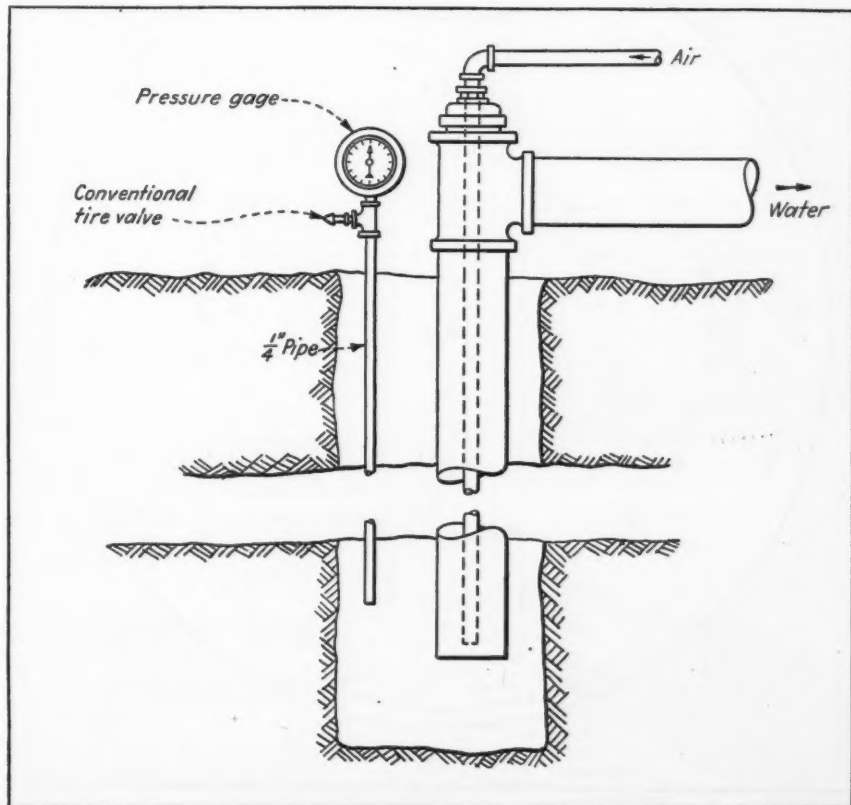


Simple Device Determines Water Flow in Wells

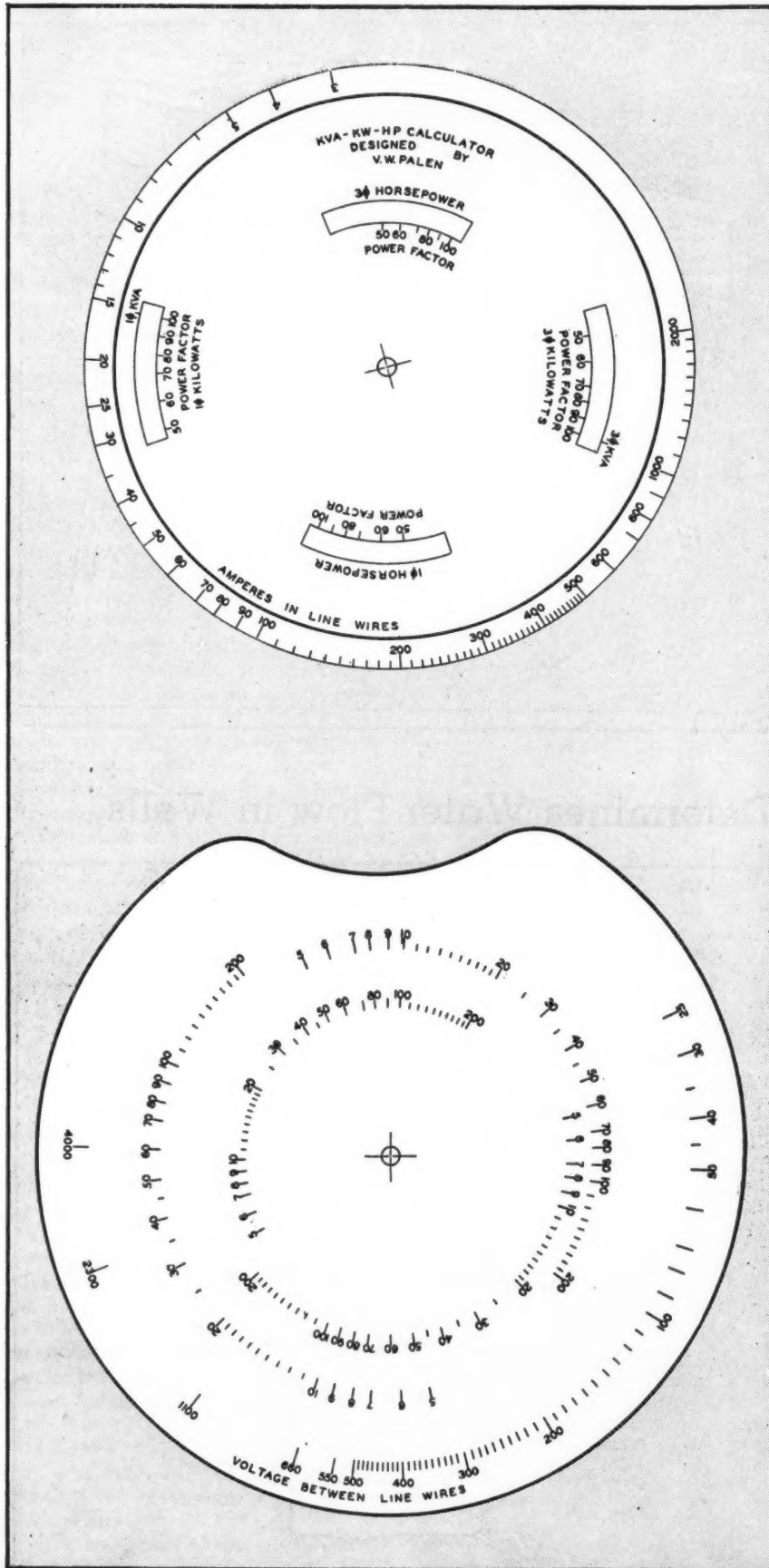
THE ARRANGEMENT SHOWN in the accompanying sketch was used successfully to determine the maximum water flow into several wells at the pumping plant of a gold-silver mine in Central Mexico. As will be seen, each well was equipped with an air lift and the auxiliary measuring arrangement, consisting of a $\frac{1}{4}$ -in. pipe, open-ended, with the upper end equipped as shown in the sketch.

After measuring the position of the water level in the well, air is pumped by a bicycle pump into the small pipe until the water is partly or completely expelled from it. The pressure registered is the head of water above the lower end of the pipe. Next, the air lift is placed in operation and successive pressure readings are taken until the gage registers a constant pressure. This indicates that the inflow balances the amount pumped. The air pressure indicated is used as a factor in calculating the head of water upon the small pipe, which is in effect a barometer.

The flow from the air lift can be measured by turning the discharge into a 100-gal. tank and taking the time required to fill it.



Rapid Calculator Solves Electrical Problems



ROUTINE CALCULATIONS involving kva.-kw.-hp. determinations should be made easier by use of a calculator devised by V. W. Palen, of Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa. The device solves single and three-phase problems expressed by the following formulas: single phase; kva. =

$$\frac{\text{volts amp.}}{1,000}; \text{kw.} = \frac{\text{volts amp. p. f.}}{1,000}; \text{hp.} =$$

$$\frac{\text{volts amp. p. f.}}{746}; \text{three phase, kva.} =$$

$$\frac{3 \text{ volts amp.}}{1,000}, \text{kw.} = \frac{3 \text{ volts amp. p. f.}}{1,000}, \text{hp.} =$$

$$\frac{3 \text{ volts amp. p. f.}}{746}$$

The range of the calculator, 5 to 200 (kva., kw., or hp., as the case may be) can be extended easily to cover a range of 50 to 2,000 merely by multiplying all values by 10. It can be used to find kva., kw., or hp. from known values of amperes and volts, or it will determine amperes for given values of volts, kva., kw., and hp. Thus, knowing the size of motor to be installed, an electrician can quickly determine amperage, and from this he knows what size wire to use in the circuit. Conversely, having read amperage at transformer terminals, one can easily calculate what load in kva. the transformer is carrying.

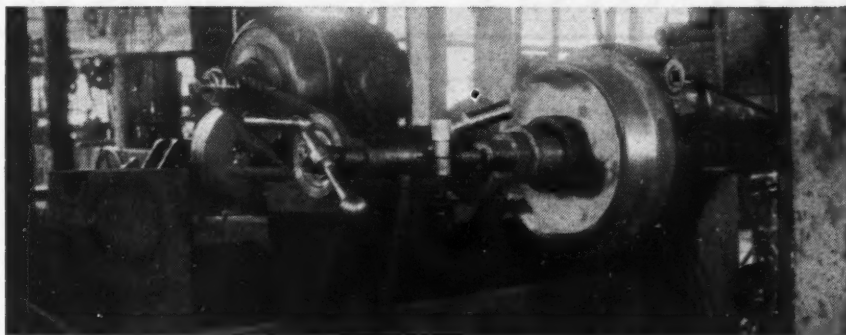
To assemble the calculator, cut out both disks, also the small windows, and mount them on cardboard with rubber cement. Punch the center holes carefully; then insert a small brass bolt in the holes. Washers should be used to save wear on the paper. The bolt should be tightened until the disks will hold their setting yet can be turned easily, and a drop of solder applied to the nut will then make the assembly permanent.

Help!

That's someone in your industry calling; someone who is now faced with the same sort of problem you had to tackle last month or last year, perhaps. Won't you help by sending us, for publication in these pages, your solution to a tough operating or maintenance problem? Include a rough sketch or a photograph if possible. For every idea used in these pages, *E.&M.J.* pays \$5, but the sense of satisfaction in having helped some other member of your industry will be worth a whole lot more to you than any compensation we could offer.

Improvised Grinder for Mine Car Wheels

THE DESIRABILITY of providing an accurate, automatic machine for grinding rebuilt mine car wheels led W. A. Vickers, master mechanic for Neptune Mining Co., Bonanza, Nicaragua, to devise the arrangement shown in the accompanying photograph. Basis for the device is an old zinc shavings cutter. A 1½-hp. motor (at left) drives the emery wheel, and a ¼-hp. gear-reduction motor from an old reagent feeder turns the wheel and drives the feed screw on which the wheel is set.



A Check on Lost Feeder Time

A TELECHRON CLOCK is used to regulate the time during which there is no ore, due to the blocking of the chutes, on the respective conveyor belts feeding each of the three grinding mills in the cyanidation plant of Wright-Hargreaves Mines, Ltd., at Kirkland Lake, Ont. There are three of these clocks, one for each ball mill. Inasmuch as the amount of ore delivered per revolution of the end pulley of the conveyor is known from the hourly belt weight taken and the recorded revolutions, the tonnage fed to each mill can be corrected for stoppage of ore flow by subtracting the recorded time of stoppages from the total recorded revolutions, multiplying the

weight of ore delivered per revolution by the number of revolutions recorded for that mill.

The Telechron clocks operate only when there is no ore on the belts. They are connected electrically to a floating arm which rests on the ore stream, so that, when the arm drops, both an alarm and the clock are put into operation through the same mercoid switch. The revolutions per minute of each belt are known. Therefore, the lost-time revolutions are deducted from the total revolutions recorded by the productometer.

The three clocks, being kept in the mill office, also serve the mill superintendent as a check upon operations on

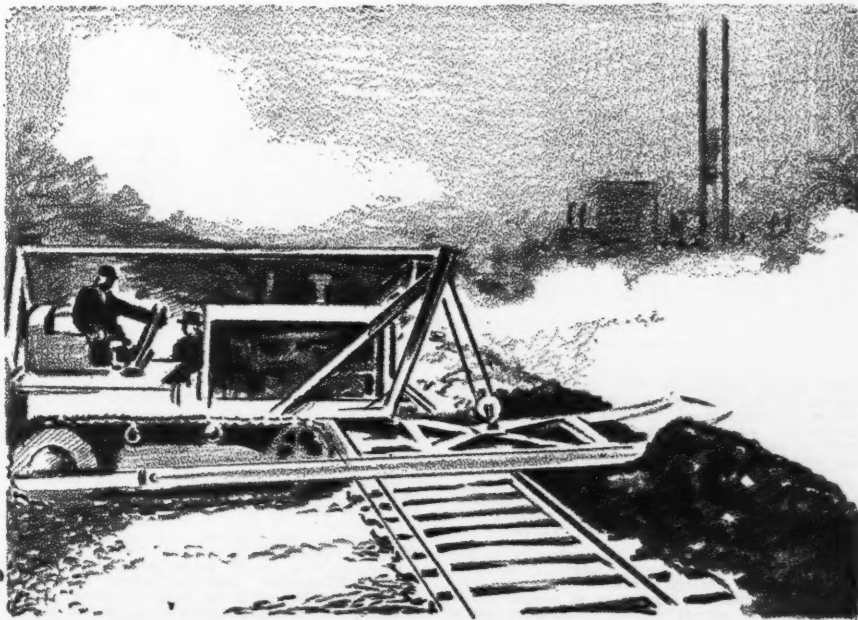
each of the mill's daily three shifts.

The superintendent is Malcolm Black, who described the entire plant in considerable detail in *E.&M.J.* of March, April, and May, 1939, incidentally telling about the electric alarm, of which a photograph was then given. It was explained that when the arm drops down the mercury in the control flows down to make contact for the horn. The mercoid control used is No. 848-X, Type 3078433, Serial No. 99780, range 122 to 195 deg. F., voltage 110 and 120, amperes 10 and 5. The clocks have been added since this description was published. Mr. Black has provided the additional information.

Specially Built Bulldozer Handles Slag-Disposal Job

DISPOSAL OF SLAG and refuse from the steel plant of Timken Roller Bearing Co., Canton, Ohio, presented a problem that was eventually solved by putting a 95-hp. tractor on the job equipped with a bulldozer especially designed for the purpose. A bulldozer blade, standard for 35-hp. tractors, was mounted on arms that extended it 17½ ft. in front of the tractor idler. The cutting edge of the blade then came 13½ in. below the bottoms of these arms.

When mill slag is dumped from cars along the edge of the pit, the tractor is brought up to the edge of the track and the bulldozer blade is lowered until the extension arms rest on the rails. With the rails thus supporting the blade and holding it to grade line, the tractor is moved ahead and the slag pushed over the edge of the pit. The tractor also moves the track ahead.



MARKET SUMMARY

ACTIVITY IN MAJOR NON-FERROUS METALS continued at a high rate throughout March. Output of war materials has increased since the beginning of the year, and inventories of manufacturers that had been reduced in anticipation of a smaller volume of business were augmented to cope with the situation. Manpower shortage was the chief concern of producers, particularly in copper. Refineries find it is becoming increasingly difficult to deliver special shapes when such requests are made on short notice.

Price developments last month were few. Quicksilver was maintained at \$130 per flask, but as March ended it was rumored that sales of scattered lots were made in New York at concessions. How-

ever, most operators feel that production is being curtailed rapidly to bring about a balanced condition between supply and demand. Consumption of quicksilver in the United States has declined to the rate of 35,000 flasks a year.

The Metals Reserve Co. announced that it is terminating contracts with eligible producers of tungsten ore who have been obtaining \$30 per unit of WO₃, or a premium of \$6. Not much more than 5 percent of the country's production will be affected. The price outlook in the regular market was unsettled, but quotations have not reflected this uncertainty.

Indium, one of the "rare" metals, was lowered in price to \$7.50@8.50 per troy ounce, a reduction of \$2.50. Demand for

the metal for bearings has increased in recent years, and efforts are being made to step up consumption in special alloys.

Deliveries of copper to customers during February amounted to 124,532 tons, against 101,779 tons in January and an average of 136,973 tons monthly for 1943. March deliveries are expected to exceed 160,000 tons, a new high. Demand for artillery ammunition accounted for a substantial percentage of the increased demands for copper, though wire mills also reported an upturn in consumption. With domestic production of refined copper holding at around 90,000 tons a month, fairly large tonnages of imported metal will be consumed instead of moving into the stockpile.

Major Metals

U.S. DAILY AND AVERAGE PRICES

1944 Mar.	Electrolytic Copper		Straits Tin New York	Lead		Zinc St. Louis
	Domestic (a) Refinery	Export (b) Refinery		New York	St. Louis	
1	11.775	11.700	52.000	6.50	6.35	8.25
2	11.775	11.700	52.000	6.50	6.35	8.25
3	11.775	11.700	52.000	6.50	6.35	8.25
4	11.775	11.700	52.000	6.50	6.35	8.25
6	11.775	11.700	52.000	6.50	6.35	8.25
7	11.775	11.700	52.000	6.50	6.35	8.25
8	11.775	11.700	52.000	6.50	6.35	8.25
9	11.775	11.700	52.000	6.50	6.35	8.25
10	11.775	11.700	52.000	6.50	6.35	8.25
11	11.775	11.700	52.000	6.50	6.35	8.25
13	11.775	11.700	52.000	6.50	6.35	8.25
14	11.775	11.700	52.000	6.50	6.35	8.25
15	11.775	11.700	52.000	6.50	6.35	8.25
16	11.775	11.700	52.000	6.50	6.35	8.25
17	11.775	11.700	52.000	6.50	6.35	8.25
18	11.775	11.700	52.000	6.50	6.35	8.25
20	11.775	11.700	52.000	6.50	6.35	8.25
21	11.775	11.700	52.000	6.50	6.35	8.25
22	11.775	11.700	52.000	6.50	6.35	8.25
23	11.775	11.700	52.000	6.50	6.35	8.25
24	11.775	11.700	52.000	6.50	6.35	8.25
25	11.775	11.700	52.000	6.50	6.35	8.25
27	11.775	11.700	52.000	6.50	6.35	8.25
28	11.775	11.700	52.000	6.50	6.35	8.25
29	11.775	11.700	52.000	6.50	6.35	8.25
30	11.775	11.700	52.000	6.50	6.35	8.25
31	11.775	11.700	52.000	6.50	6.35	8.25
AVERAGES FOR MONTH						
Mar.	11.775	11.700	52.000	6.50	6.35	8.25
AVERAGES FOR WEEK						
Mar.	11.775	11.700	52.000	6.50	6.35	8.25
8	11.775	11.700	52.000	6.50	6.35	8.25
15	11.775	11.700	52.000	6.50	6.35	8.25
22	11.775	11.700	52.000	6.50	6.35	8.25
29	11.775	11.700	52.000	6.50	6.35	8.25
CALENDAR WEEK AVERAGES						
Mar.	11.775	11.700	52.000	6.50	6.35	8.25
4	11.775	11.700	52.000	6.50	6.35	8.25
18	11.775	11.700	52.000	6.50	6.35	8.25
25	11.775	11.700	52.000	6.50	6.35	8.25

THE above quotations for major non-ferrous metals are our appraisal of the important United States markets, based on sales reported by producers and agencies. They are reduced to the basis of cash, New York or St. Louis, as noted. All prices are in cents per pound.

(a) Net prices at refineries on Atlantic seaboard. To arrive at the delivered New England basis add 0.225c. per pound, the average differential for freight and delivery charges.

(b) Export prices are net at refineries on the Atlantic seaboard and include sales of domestic copper in the foreign market. Owing to the World War and the disruption of normal trade relations, our export copper quotations, since September, 1939, have been based largely on f.a.s. transactions, ex United States ports. We

deduct .05c. from the f.a.s. basis (lighterage, etc.) to arrive at the f.o.b. refinery quotation.

Copper, lead and zinc quotations are based on sales for both prompt and future deliveries; tin quotations are for prompt delivery only.

Quotations for copper are for the ordinary forms of wirebars and ingot bars; cathodes are sold at a discount of 0.125c.

Quotations for zinc are for ordinary Prime Western brands. Zinc in New York commands a premium over the St. Louis basis equal to the freight differential. Contract prices for High Grade zinc delivered in the East and Middle West in nearly all instances command a premium of 1c. per pound over the current market for Prime Western but not less than 1c. over the Engi-

Gold, Silver, Sterling

DAILY AND AVERAGE PRICES

1944 Mar.	Sterling Exchange "Checks" (Nominal)	"90-day demand"	Silver		Gold (d) United States
			(c) New York	London	
1	401.000	⌘	44.750	23.500	168s 35.00
2	401.000	⌘	44.750	23.500	168s 35.00
3	401.000	⌘	44.750	23.500	168s 35.00
4	401.000	⌘	(e)	(e)	(e) 35.00
6	401.000	⌘	44.750	23.500	168s 35.00
7	401.000	⌘	44.750	23.500	168s 35.00
8	401.000	⌘	44.750	23.500	168s 35.00
9	401.000	⌘	44.750	23.500	168s 35.00
10	401.000	⌘	44.750	23.500	168s 35.00
11	401.000	⌘	(e)	(e)	(e) 35.00
13	401.000	⌘	44.750	23.500	168s 35.00
14	401.000	⌘	44.750	23.500	168s 35.00
15	401.000	⌘	44.750	23.500	168s 35.00
16	401.000	⌘	44.750	23.500	168s 35.00
17	401.000	⌘	44.750	23.500	168s 35.00
18	401.000	⌘	(e)	(e)	(e) 35.00
20	401.000	⌘	44.750	23.500	168s 35.00
21	401.000	⌘	44.750	23.500	168s 35.00
22	401.000	⌘	44.750	23.500	168s 35.00
23	401.000	⌘	44.750	23.500	168s 35.00
24	401.000	⌘	44.750	23.500	168s 35.00
25	401.000	⌘	(e)	(e)	(e) 35.00
27	401.000	⌘	44.750	23.500	168s 35.00
28	401.000	⌘	44.750	23.500	168s 35.00
29	401.000	⌘	44.750	23.500	168s 35.00
30	401.000	⌘	44.750	23.500	168s 35.00
31	401.000	⌘	44.750	23.500	168s 35.00
AVERAGES FOR MONTH					
Mar.	401.000	.....	44.750	23.500	.... 35.00
AVERAGES FOR WEEK					
Mar.	401.000	.....	44.750	.....	.....
8	401.000	.....	44.750	.....	.....
15	401.000	.....	44.750	.....	.....
22	401.000	.....	44.750	.....	.....
29	401.000	.....	44.750	.....	.....

Calendar week averages. New York Silver: Mar. 4th, 44.750; 11th, 44.750; 18th, 44.750; 25th, 44.750.

(e) Not quoted (Saturday). (f) No quotation.

neering and Mining Journal's average quotation for Prime Western for the previous month.

Quotations for lead reflect prices obtained for common lead, and do not include grades on which a premium is asked.

(c) Silver other than newly-mined domestic, by Handy & Harman. Under Treasury order of July 6, 1939, the price on domestic newly-mined silver mined subsequent to July 1, 1939, was fixed at 71.11c. per troy ounce. Handy & Harman's quotations on newly-mined domestic silver, 999 fine was 70 3/4 c. throughout March.

(d) U. S. Treasury's gold price. Actual payment by the United States Treasury for gold in domestic and imported ore or concentrate is at 99.75 per cent of the price quoted by the Treasury, which is equal to \$34.9125.

Zinc has been in better demand, following improvement in brass making, yet stocks on hand are increasing. According to the statistics of the American Zinc Institute, stocks of zinc at the end of February amounted to 210,683 tons, against 194,095 tons a month previous. Production of slab zinc in February was at the highest daily rate (2,756 tons) on record.

Consumption of primary lead has improved and is expected to average between 60,000 and 65,000 tons a month during March and April. The industry believes that close to 18,000 tons of foreign lead will be shipped to domestic consumers during April to round out their needs.

Canadian authorities announced that sales of aluminum to the United States are being made at the equivalent of 15c, the same figure obtaining here.

Magnesium production was curtailed by WPB. Output has been running in excess of requirements, and the stocks on hand now are sufficient to cover two months' needs. Total rated capacity of all plants is 586,000,000 lb. a year.

Miscellaneous Metals Monthly Averages

Average prices of miscellaneous metals for February and March.

(a) New York, packed in cases, in lots of 5 tons or more but less than a carload. (b) Nominal. (c) Producer's price for commercial sticks. (d) Average producers' and platers' quotations. (e) Special shapes sold to platers.

	Feb.	Mar.
Quicksilver, N. Y. flask.	130.000	130.000
Antimony (a)	15.839	15.839
Antimony, bulk, Laredo.	14.500	14.500
Antimony, bulk, N. Y.	15.265	15.265
Antimony, Chinese (b)	16.500	16.500
Platinum, oz. troy	35.000	35.000
Cadmium (c)	90.000	90.000
Cadmium (d)	92.500	92.500
Cadmium (e)	95.000	95.000
Aluminum, ingot	15.000	15.000

E & M J Price Index

Weighted index of non-ferrous metal prices (copper, lead, zinc, tin, silver, nickel, and aluminum). The average for the years 1922-1923-1924 equals 100.

1929	110.33	1936	73.45
1930	82.87	1937	90.86
1931	60.20	1938	73.67
1932	48.26	1939	77.71
1933	59.79	1940	79.22
1934	69.59	1941	83.49
1935	74.66	1942	86.80
		1943	88.74

	1942	1943	1944
January	85.39	88.74	88.74
February	85.90	88.74	88.74
March	85.90	88.74	88.74
April	85.90	88.74	88.74
May	85.90	88.74	88.74
June	85.90	88.74	88.74
July	85.90	88.74	88.74
August	85.90	88.74	88.74
September	88.74	88.74	88.74
October	88.74	88.74	88.74
November	88.74	88.74	88.74
December	88.74	88.74	88.74

Miscellaneous Metals, Ores, Minerals

Quotations cover wholesale lots, prompt shipment, f.o.b. New York, unless otherwise stated (March 1, 1944)

MISCELLANEOUS METALS

Aluminum, ingot, 99 plus per cent, lb.	15c.
Antimony, domestic, spot, lb. 5 tons or more	15.839c.
Bismuth, ton lots, lb.	\$1.25
Cadmium, commercial sticks, lb.	90c.
Calcium, lb., ton lots 97 @ 98 per cent.	\$1.25
Chromium, 97 per cent grade, lb.	89c.
Cobalt, 97 to 99 per cent, per lb.	\$1.50
Indium, troy oz.	\$7.50@8.50
Nickel, electrolytic cathodes, lb.	35c.
Magnesium, 99.8 per cent, carloads, lb.	20½c.
Palladium, troy oz.	\$24.00
Platinum, (Official quotation) troy oz.	\$35.00
Quicksilver, flask of 76 lb., 100 flasks or more	\$130.00
Selenium, 99.5 per cent, lb.	\$1.75
Silicon, minimum 97 per cent, spot, carloads, lb.	14.75c.
Tellurium, lb.	\$1.75
Thallium, 100 lb. or more, lb.	\$10.00
Titanium, 96 to 98 per cent, lb.	\$5.00

METALLIC ORES

Beryllium Ore, 10 to 12% BeO, f.o.b. mines, ton	(b) \$100.00@120.00
Chrome Ore, per long ton, f.o.b. cars Atl. ports, dry, 48% Cr ₂ O ₃ , 2.8 to 1 ratio	\$41.00
48% Cr ₂ O ₃ , 3 to 1 ratio	\$43.50
Iron Ore, Lake Superior, Lower Lake ports, long ton:	
Old Range bessemer	\$4.75
Mesabi bessemer	\$4.60
Old Range non-bessemer	\$4.60
Mesabi, non-bessemer	\$4.45
Lead (Galena) 80 per cent, Joplin, Mo., ton	\$76.01
Manganese (dutyable) f.o.b. cars Atl. ports, long ton unit Mn:	
80 per cent	79.8c.
48 per cent	78.8c.
46 per cent	76.8c.
Manganese Ore, domestic, 48%, f.o.b. MRC depot, l.t. unit.	\$1.00
Molybdenum Ore, 90%, per lb. of MoS ₂ , f.o.b. mines	\$55.28
Tungsten Ore, per unit of WO ₃ :	
Chinese, 65 per cent, duty paid	(b) \$24.00
Domestic, 65 per cent and upward	(a) \$26.00
Vanadium Ore, per lb. of contained V ₂ O ₅ , f.o.b. mines	27.50c.
Zinc Ore, Prime, 60 per cent concentrate, Joplin, Mo.; per ton.	\$55.28

(a) Prices at mines, small lots, usually several dollars less. (b) Nominal

METALLIC COMPOUNDS

Arsenious Oxide (arsenic) lb.	4c.
Cobalt Oxide, 70 @ 71 per cent, lb.	\$1.84
Copper Sulphate, 100 lb.	\$5.00

ALLOYS

Beryllium Copper, 2.5 to 3 per cent Be, per lb. of contained Be	\$15.00
Ferromanganese, 65 @ 70 per cent per pound of Cr contained	13c.
Ferromanganese, 78 @ 82 per cent, gross ton.	\$135.00
Ferromolybdenum 55 @ 65 per cent Mo, lb. of Mo, contained.	95c.

Ferrosilicon, 50 per cent, per lb. of contained Si	6.65@8.10
Ferrotungsten, 75 @ 80 per cent, lb. of W contained	\$1.90
Ferrovandium, per lb. of V, delivered	\$2.70@2.90
Silicomanganese, 1 per cent C, gross ton	\$133.00

NON-METALLIC MINERALS

Asbestos, f.o.b. Canadian (Quebec) mines (U. S. funds), ton:	
Crude No. 1	\$650@750
Crude No. 2	\$165@335
Spinning fibers	\$124@233
Paper stock	\$44@49.50
Shorts	\$14.50@26.50
Vermont, f.o.b. Hyde Park:	
Shingle stock	\$62.50@65.00
Paper stock	\$44.00@53.00
Shorts	\$14.50@28.50
Floats	\$19.50
Barytes, long ton:	
Georgia, crude	\$8.50@9.00
Missouri, 93 per cent BaSO ₄ , less than 1 per cent iron	\$6.75@7.25
Bauxite, long ton:	
Domestic, crude, 50 @ 52 per cent (not dried)	\$5.00
Domestic, chemical, 55 @ 58 per cent	\$7.50@8.50
Domestic, abrasive, 80 @ 84 per cent	\$16.00
China Clay, f.o.b. mines, ton:	
South Carolina and Georgia, No. 1, bulk	\$6.75@8.00
Delaware, No. 1	\$15.00
Feldspar, bulk, ton:	
Potash feldspar, 200 mesh	\$17.00
Glass-spar, white, 20 mesh	\$11.75
Fluorspar, f.o.b. mines, bulk, Kentucky and	
Illinois 85-5 per cent, all rail movement, ton	\$33.00
Acid 98 and 1 per cent, bulk, ton	\$37.00
Fuller's earth, f.o.b. Georgia or Florida, ton	\$7.00@14.00
Magnesite, per ton dead-burned, f.o.b. Washington	\$22.00
Mica—Base prices on sheet, North Carolina one-half trim, as posted by the Colonial Mica Corp., the Government's buying agency for obtaining strategic mica, per pound, follow: Sheet to cut minimum of 1½ x 2 in. \$2.40; 2 x 2 in. \$3.52; 2 x 3 in. \$4.64; 3 x 3 in. \$5.12; 3 x 4 in. \$6.08; 3 x 5 in. \$7.04; 4 x 6 in. \$8.00; 6 x 8 in. \$9.12; punch, 30c. Premium and discounts up to 40 per cent, depending on quality and trim. Scale does not apply to non-strategic mica.	
Ocher, Georgia, ton	\$19.00@22.00
Pyrites, Spanish, per long ton unit of S, c.i.f. Atlantic ports	12c., nom.
Silica, in bags, 325 mesh, ton	\$20.00@40.00
Sulphur, Texas, mines, long ton	\$16.00
Talc, f.o.b. works, ton:	
New York, double air-floated, 325 mesh	\$12.00@15.00
Vermont, extra white, 200 mesh	\$9.50@10.50
Tripoli, Missouri, ton:	
40 mesh, cream colored	\$14.50
200 mesh, cream colored	\$26.00
IRON AND STEEL	
Fig Iron, Valley furnaces, gross ton: Basic	\$23.50
Steel, base prices, Pittsburgh Billets, gross ton	\$34.00
Structural shapes, 100 lb.	\$2.10

WASHINGTON REFLECTIONS

McGraw-Hill WASHINGTON NEWS BUREAU

Stockpile Legislation Is Marking Time

All factions in government and industry which have shown any interest in mineral stockpiling are agreed upon the desirability of stockpiling legislation, but in the meantime little progress is being made. Senator Scrugham, the original Congressional proponent of such legislation, has been ill for several weeks, and partly for this reason the issue has stagnated. In addition, various factions in government are opposed to features of the Scrugham bill and have been holding discussions with a view to finding a basis for agreement, either on amending the Scrugham bill or introducing substitute legislation. Probably the introduction of a substitute bill would be unfortunate, as it is likely to jeopardize passage of any bill at all. Congress in general is sufficiently apathetic toward the stockpile issue that the combined strength of all the proponents is necessary to get legislation passed. Also, the Scrugham bill has gone through the hearing process and has been modified in consonance with views thus expressed. Senator Scrugham has shown a willingness to listen to suggestions toward improvement of the bill. Therefore, there seems to be small justification for sidetracking his bill and substituting alternative legislation.

Within the departments there is concern because the Scrugham bill as amended involves control by a board selected entirely from the mining industry, the principal fear being that industry men might fail to take a national viewpoint in formulating stockpiling policy. Probably there is weight to the departmental view that government agencies should have more voice in stockpile control. Also there is opposition in some quarters to setting up a new policy of subsidization under the "buy American" feature of the bill. Considering that the bill has another feature intended to help marginal producers and their employees by carrying them at wartime prices for a year beyond the end of the war, it seems like a reasonable compromise to delete the "buy American" clause and leave this matter to the discretion of the proposed board. Moreover the "buy American" feature would be the most difficult part of the Scrugham bill to get through Congress, even without departmental opposition.

There are signs that interested parties recognize the need for compromising on a bill which all can support, and it is quite possible that agreement may be reached very soon.

Members of the industry should realize that their support is vital to achieve passage of stockpiling legislation. Up to

the present time Congressional mailbags have provided small evidence that the industry is giving this issue attention commensurate with its importance.

Approval by the joint chiefs of staff of a WPB policy on stocks is being given undeserved notice. Actually the policy has been in operation for over two months (*E.&M.J.*, February, p. 114) and has nothing to do with the issue of stockpiling raw materials after the war.

Committee Dissects Magnesium Industry

A report of the Truman committee purporting to be a survey of the magnesium industry, issued March 13, was highly critical of the conduct of this aspect of the war effort. Taking a sideswipe at the tendency of the armed services to overestimate requirements, the committee noted that all needs were met despite the fact that production was far behind schedule. Shipments in 1943 were 348 million pounds, production was 391 million pounds, and estimates of needs made in 1942 were 448 million pounds.

The committee generally praised the performance and competence of the Dow Chemical Co. and subsidiaries, but with great clarity in hindsight implied a rebuke in the statement that "... it is incumbent upon any company which achieves a monopoly in production in the United States of any basic commodity to make certain that the United States produces an equal or greater quantity of that commodity and enjoys as widespread a use of it as any other country." This comment concerned the admission of the Dow company that its investments in magnesium production had not been in excess of what it hoped would eventually prove to be profitable. The Dow company produced 61 percent of the metal made in 1943.

The report also reviewed the cartel agreement between Alcoa and I. G. Farben and its subsequent deal with the Dow company which gave the latter a monopoly in the production of ingot metal.

The committee praised the Henry J. Kaiser organization for its achievements in getting the Hansgirk process into operation. No investigation was made into why Dr. Hansgirk was put in jail as an enemy alien and prevented from helping get the plant into operation. The implication of the report is that the Dow and Hansgirk processes have the edge on costs over the ferrosilicon process and that cutbacks therefore will affect plants using the latter process most seriously.

According to information in the report, the ultimate cost position of the Magnesium Elektron process, used in the giant Basic Magnesium plant near Boulder

City, Nev., is in doubt. Progress made in reducing costs affords some basis for hope that this process may be brought to a competitive basis.

The report bitterly condemns the conduct of the Basic Magnesium enterprise as to the nature of the initial contracts, the competence of administration, the relationship of profits to investment and risk, and as to location of the plant. The long haul from the mines at Gabbs to the plant is characterized as a fundamental handicap to the operation. However, the report praises the competence and progress of the Anaconda company after it assumed management of the enterprise.

The committee condemned the War Production Board for failing to show more interest in the Idaho Maryland process of producing magnesium chloride from serpentine and implied that this process affords hope of less than a 10c. price for the metal. The lowest-cost metal now being produced is from the Dow-operated plant at Velasco, Tex., which uses sea water, the cost being 12.4c. (apparently ex capital charges). Metal from Dow's privately owned plants is being sold at 20.5c. Basic Magnesium's operating cost had been brought down to 23.5c. by November 1943. The lowest initial operating cost of the six ferrosilicon plants was 19c. The Kaiser contract for Hansgirk metal involves a price of 30c. or cost of production, whichever is lower. The Hansgirk product has the advantage of being turned out as powder, the form in which it is used for incendiary bombs.

The report quotes Arthur Bunker, former chief of the Aluminum-Magnesium Branch of WPB, as of the opinion that operating costs for the ferrosilicon process should be between 15c. and 25c., and the operating cost of electrolytic metal between 12c. and 20c.

There are two privately owned and 13 government owned magnesium plants. The government has a plant investment of 370 million dollars and has advanced operating expenses of 116 million dollars, of which 58 million has been repaid. A forecast of 531 million pounds production was made for 1944, before cutbacks were initiated (see p. 103).

A reply to the Truman committee by Howard Eells, Jr., president of Basic Refractories, Inc., which established the Basic Magnesium enterprise, was issued on March 28. Mr. Eells accused the committee of a wilful smear of him and his associates by seizing every opportunity to misinterpret their motives. He stated that the public whipping at the hands of the committee was a consequence of the refusal of his group to deal with "politicians, fixers, organized gambling interests, and other parasites." The statement then goes into detail in refuting some specific charges of the committee.

Machinery Created to Handle Surpluses

Next problem facing official Washington is to review material programs of the armed services to see whether they have been kept within reasonable limits. With the shortage of manpower rapidly approaching its most critical stage, it is important that the armed services are assured everything they need; however, there should be some limit, so that they do not get surpluses beyond all conceivable needs.

The Baruch report laid down broad principles of a sales program for surplus commodities. Almost simultaneously, the President, by executive order, set up the machinery for disposal with Under-Secretary of Commerce Will Clayton in charge.

It was announced soon after that sales of surplus property would be arranged through four principal channels. Capital goods, whether real estate, complete plants, or plant equipment and machinery, are to be sold by the Reconstruction Finance Corp. Surplus goods of the type ordinarily bought for the government by the procurement division of the Treasury will be sold by that agency when in surplus. This follows the normal peacetime procedure. Food surpluses and related agricultural materials are to be handled by the War Food Administration in accordance with the original plan.

The sale of industrial goods under the program established by the Reconstruction Finance Corp. indicates that at least three classes of activities are to be organized. These correspond to the three kinds of business which the government's great banking agency ordinarily has to handle in its financial services to government and industry. These can be briefly stated as:

1. Metals Reserve Co. will handle the disposal of surplus ores, metals, scrap, and related commodities. These are the goods which it has been buying for the government, both after import and through subsidized domestic production.

2. Plant and machinery disposal will be carried out through Defense Plant Corp., which has been the agency which financed the building of plants and the expansion of plant facilities. This will include real estate, complete plants, and manufacturing equipment and facilities normally used in plants.

3. Defense Supplies Corp. will handle other industrial goods, probably including such things as chemicals. It has been the purchase or procurement agent for the government with respect to such commodities in many circumstances. Hence, its staff is already acquainted with the sources of supply and the industrial requirements of the nation for these industrial commodities.

Such was the tentative set-up of the disposal organization as it began to take shape during March. It is subject to change both in detail of organization and in its broad set-up.

The executive order which established

the Surplus War Property Administration in the Office of War Mobilization established an advisory policy board but gave full power and responsibility to the administrator. This set-up is like that of the War Production Board, where full authority is vested in the chairman. It will be the duty of the administrator to dispose of goods and facilities that have been declared surplus by other government agencies. When the property has been declared surplus, the Surplus War Property Administrator may delegate the authority to another agency and determine the broad policies that are to be followed.

Metal Markets Likely To Be Affected

Apparently, the policy will be to dispose of as much surplus property as possible before the end of the war, and the pressure to sell metal and concentrates may be very strong. The big five of liquidation, Jones, Crowley, Clayton, Baruch, and Hancock, are all strongly private-enterprise minded, and can be expected to do their utmost to divorce the government from business as rapidly and completely as possible while public sympathies lean in the same direction. The desire to accomplish this is likely to evoke some tendency to ride roughshod over details. One such detail may be industry resistance to selling metals or concentrates in a restricted market in competition with producers whose sales volumes are completely controlled by government.

Analysis of the salvage activity of the War Department during the 1943 fiscal year is as follows:

	Net Tons	Amount
Ferrous metal	598,100	\$ 8,199,000
Non-ferrous metal	299,280	49,386,000
Wool rags and clippings	9,530	3,148,000
Cotton rags and clippings	13,920	892,000
Waste paper	56,800	369,000
Tin cans	23,500	259,000
Scrap rubber	12,300	318,000
Fats, grease, bones, etc.	33,600	1,488,000
Kitchen waste		1,383,000
Miscellaneous		7,690,000
Total		\$73,092,000

It is notable that non-ferrous metals make up nearly two-thirds of the value of the transactions.

Goods, plants, and equipment valued at approximately \$50,000,000 have already been put on the market by the government. The War Department redistributed \$74,000,000 worth of surplus property between July 1 and Sept. 30. Only about \$10,000,000, or less than 14 percent, found its way into non-governmental channels. Unserviceable property disposed of for salvage during the fiscal year which ended June 30, 1943, amounted to

\$73,092,000. Of this amount approximately \$55,000,000 worth was sold through channels approved by the War Production Board at OPA ceiling prices.

Industry Must Prepare For Manpower Losses

The paramount issue now before government and industry is over the inroads that military requirements for manpower are threatening to make into personnel which industry considers vital to sustained production. Reports emanating from official sources are so confusing that people in essential industries, such as mining, cannot make head or tail of what is in store for them.

The position of the armed forces is plain enough. They want all the able-bodied men in the age bracket 18 to 25, regardless of family or industry status, and are willing to risk whatever production losses will develop from this program. Older men, up to age 38, will be taken also, but the pressure will be on the younger ages, with the limit rising gradually above age 25 as the manpower pool dwindles. The armed forces are behind schedule on inductions, and see no other way to meet their requirements. The older men, particularly those with dependents, simply do not make as good soldiers as the younger ones. They are less amenable to discipline, more conscious of risk, and less resistant to shock, privation, and injury.

On the other hand, industry men, such as the heads of the War Production Board, see such a program, if applied indiscriminately, as bound to injure several production schedules fully as vital to the armed forces as manpower. However, conferences with the military chieftains have made sufficient impression on these men as to the urgency of military manpower requirements that their hopes of deferment are limited only to three vital industries, electronics, synthetic rubber, and high-octane gasoline.

These statements are based on direct interviews of E.&M.J. representatives with the highest authorities. Therefore, it seems as though current utterances which lead people in industries such as mining to have hope of special treatment are simply political maneuvering based on the unwillingness of the high command to make a frank statement of an unpleasant fact with election time so close at hand. Because of its political significance, agriculture may get better treatment than other "essential" industries outside of the three mentioned above, but the simple statistics of the problem facing the armed forces preclude any real hope for industries such as mining. Moreover, the fairly easy situation in mineral raw-material supplies will not help the mining industry case. The basis for special treatment of the three favored industries is simply that they are so new that their technically competent men are in general much younger than is the case in older industries. Even these industries cannot hope to escape scot-free.

NEWS OF THE INDUSTRY

Canadian Institute Meets at Toronto

A crowded program received the attention of the thousand and more persons who registered March 20 and 21 in the Royal York Hotel, at Toronto, for the annual meeting of the Canadian Institute of Mining and Metallurgy. The inaugural session opened promptly with R. A. Bryce, the retiring president of C.I.M.M., in the chair. A fitting background was provided by W. H. Losee, of the Dominion Bureau of Statistics, who gave a picture of the Canadian mineral industry in 1943.

Formal welcome was extended at luncheon, H. C. Ricaby, Ontario's Deputy Minister of Mines, presiding. He advised all to consider certain proposed labor legislation, which, if enacted, would bring many young engineers under the labor code. The tax burden and the decline in prospecting were stressed by the Minister, Leslie Frost.

A brief on mine taxation has at last been submitted to the Ottawa government, Mr. Bryce said that afternoon, discussing Institute activities. The War Metals Advisory Committee has also been offered to the Government to function as a committee on postwar reconstruction.

Discussion of the functions and purposes of the Institute occupied the rest of this session. Opinion was general that the Institute was primarily a technical, not an industrial, organization. Nevertheless, some held that it should be active in demanding government policies that will solve the industry's problems; that effort should be made to improve the standing of the engineer in his community; that with the prospect of several years of Federal control, they could not afford to see their wishes go unexpressed.

Four simultaneous sessions (Mining, Geological, Metallurgical, and Industrial Minerals) filled Tuesday morning's program. Outstanding were three papers on the present status of aluminum therapy for controlling and mitigating silicosis. "Progress" was dealt with by Dr. W. D. Robson; "Engineering Aspects" by A. W. Jacob; and "Practice in the United States" by Dr. J. W. G. Hannon. These papers are to be published in the April C.I.M.M. "Bulletin." The results obtained are most encouraging. Many Ontario companies and some others are already using, or preparing to use, the procedure.

Among the other papers may be mentioned: "Postwar Mineral Control," by G. B. Langford, of Toronto University, wherein is advocated world control of price, production, and market; and "Mapping by the Bureau of Geology and Topography," by K. G. Chipman and George Hanson, an important subject, if new areas are to be mapped for future development.

At luncheon, presided over by E. A. Collins, Principal R. C. Wallace, of Queens University, discussed "Our Natural Resources and Reconstruction." At the afternoon session, the same subject was dealt with by Dean J. J. O'Neill, of McGill University, following whom Prof. C. G. Williams, of Toronto, discussed "The Postwar Status of the Engineer," saying that the engineer's voice is not heard today in legislative chambers, because he does not muster sufficient votes, and that he is doing nothing about it. At this meeting the activities of the Wartime Bureau of Technical Personnel also were considered briefly. Some excellent pictures of the blast-hole diamond drilling at the Raft Lake cuts on the Steep Rock project were then shown by C. H. Hopper, of Boyles Brothers.

At the annual dinner that evening the speaker was Hon. George Drew, Premier of Ontario, who urged development of Canadian air routes as of great importance to the Dominion's postwar mining. At this time the various awards of the Institute were made.

Supreme Court Upholds Alabama Portal Pay

Underground travel time for iron-ore miners of Alabama constitutes working time and must be paid for under the Fair Labor Standards Act, the Supreme Court ruled on March 27 in a seven-man majority opinion, written by Justice Frank Murphy. A sharp dissent was entered by Chief Justice Harlan F. Stone and

Justice Owen J. Roberts, the latter writing the opinion.

The decision sustained the rulings by two lower courts favoring payment of wages on a portal-to-portal basis, and it may be applied as a precedent in the pending coal-mining cases, where two suits concerning portal-to-portal pay are awaiting consideration. A portal-to-portal contract for coal miners is now up before the NLRB for approval.

The Alabama companies concerned were Republic Steel Corp., Sloss-Sheffield Steel & Iron Co., and Tennessee Coal & Iron Co.; and the union involved includes locals of District 5 of the Mine, Mill & Smelter Workers (CIO). The first two companies acknowledged that the ruling marked "the end of the fight." Tennessee Coal & Iron made no formal statement. Union leaders, including Philip Murray, president of the CIO, hailed the decision as "one of the outstanding gains made for the underground miner in the last half-century."

The ruling was made retroactive to 1938, when the wage-hour law became effective, and it was estimated that the 6,000 miners involved would receive more than \$2,000,000 in back pay as a result.

In the majority opinion, Justice Murphy said, "We are not here dealing with mere chattels or articles of trade, but with the rights of those who toil, of those who sacrifice a full measure of their freedom and talents to the use and profit of others." Justice Murphy went on to describe the alleged hardships undergone by workers entering the mines.

"The long rides taken by the men in the dark, malodorous shafts," he said, and "the exacting and dangerous condi-



NEW SHORT CREEK MILL of Tri-State Zinc Co., near Galena, Kan., which is designed to re-treat 50 tons per hour of mill tailings excavated from the creek bed. Between 500,000 and 600,000 tons of tailings, the accumulation of decades, is available. The mill uses screens, rolls, and tables. Victor C. Allen, of Joplin, is general superintendent

tions in the mine shafts stand as a mute, unanswerable proof that the journey from and to the portal involves continuous physical and mental exertion as well as hazard to life and limb." The Fair Labor Standards Act, he added, "was not designed to codify or perpetuate these customs and contracts which allow an employer to claim all of an employee's time while compensating him for only a part of it."

Justice Roberts opened his dissent by saying, "The question for decision in this case should be approached not on the basis of any broad humanitarian prepossessions we may all entertain, not with a desire to construe legislation to accomplish what we may deem worthy objects, but in the traditional, and if we are to have a government of laws, the essential, attitude of ascertaining what Congress has enacted, rather than what we wish it had enacted."

He asserted that the Fair Labor Standards Act "was not intended by Congress to turn into work that which was not work, or not so understood to be, at the time of its passage," nor was it intended to have the courts "designate as work some activity of an employee which neither employer nor employee had ever regarded as work merely because the court thought that such activity imposed such hardship on him . . . that he ought to be compensated."

Tungsten Premium Pay Ends April 30, 1944

Premium price payments to tungsten producers will be discontinued on April 30, 1944, the WPB announced on March 1. Notice of the discontinuance was mailed by Metals Reserve Co. so as to give 30 days' time allowance, as provided in the contracts between producers and MRC. The action was taken because adequate stockpiles of tungsten have been built up, and current domestic production and imports are now more than sufficient to meet current demands.

Those tungsten producers who qualified as "eligible" were paid \$30 per unit (20 lb.) of contained WO_3 in their ores or concentrates. This price, which is \$6 above the current market price, was set in November, 1942, to secure needed tungsten from marginal mines. Under the new program, domestic buying by MRC will continue at \$30 per unit until April 30, and thereafter at \$24 per unit until June 30.

Tungsten contracts provide for a termination payment of \$3 per unit for the part of the calendar year remaining after cancellation, based on rate production for the six months preceding date of cancellation. In accordance with this contract provision, eligible producers are being given a choice of the following three plans of termination: (1) termination of MRC purchase provisions as of March 31, with termination payments for the remaining nine months of 1944; (2) continued sale to MRC at \$30 until April



Photo from Three Lions

THE ST. JOE SHOVEL, which for many years has been responsible for loading the bulk of the ore in the Southeast Missouri mines of St. Joseph Lead Co., was designed expressly to work in the type of openings required by the nature of the orebodies encountered. The St. Joe staff, notably Arthur A. Mitchell, and the Thew Shovel Co. collaborated in the design

30 and termination payments for eight months thereafter; (3) further continued sale to MRC from April 30 to June 30 at \$24 per unit with termination as of June 30 and termination payments for six months thereafter.

It was further explained that a similar curtailment program will be followed by the Foreign Economic Administration in the procurement of tungsten from abroad. The price reduction and decrease in domestic production and imports will be made effective coincidentally by MRC and the FEA.

Following this announcement, Senator James E. Murray, of Montana, and Senator James G. Scrugham, of Nevada, issued on March 7 a statement which said, in part, "There is no possible excuse for the cancellation of Metals Reserve contracts upon the minimum 30 days' notice. . . . The War Production Board has been aware of actual conditions for months. If it be said that the producers knew the terms of the contract to obtain the \$6 per unit bonus, it is also true they had no alternative if they were to remain in business . . . If the domestic price is permitted to drop below \$24 per unit, we will soon be again dependent upon foreign tungsten, and a comparatively new American industry, easily capable of taking care of peacetime requirements for many years to come, will be ruined."

Whether Metals Reserve intends to support the market at \$24 per unit after June 30 is a question that trade authorities were asking, with no answers forthcoming up to the end of March. Many expect production to decline somewhat, but it is pointed out that the Denver conference of the CMA and the AMC brought out the fact that 50 percent

of current tungsten consumption is from domestic sources, but only 5 percent of the production has been from "eligible" producers.

The predicament of at least one group of small tungsten producers was brought out by the Fresno County, Calif., Mines and Minerals Committee, which pointed out in a letter to Metals Reserve Co. that the basing of termination payments on the rate of production for six months prior to cancellation was unfair to Fresno miners, at least, inasmuch as their mines could not be worked during the winter months. It was suggested that settlement be based on the individual mine's operating time during the period designated by the MRC contracts.

Magnesium Output Cut By WPB Order

Magnesium production was cut by about 6 percent of the country's capacity, or 34,000,000 lb., by a WPB order announced in Washington on March 17. Total rated capacity of all plants in the country is 586,000,000 lb. yearly, though production has not at any time reached that figure.

The companies affected by the curtailment order, and the cuts in output in relation to their rated capacity, are as follows: Electro Metallurgical Co., Spokane, Wash., 50 percent; Ford Motor Co., Dearborn, Mich., 100 percent; Permanente Metals Corp., Manteca, Calif., 50 percent; Matheson Alkali Works, Lake Charles, La., 100 percent; Amco Magnesium Corp., Wingdale, N. Y., 35 percent.

Only one of the plants named, that of

Permanente Metals, has been operating at capacity, according to the WPB, and curtailment in most cases works no hardship to the producers. In the case of Electro Metallurgical Co., the order merely freezes production at present rates. Of the plants named, all except Matheson Alkali Works use, or used, variants of the ferrosilicon process. Matheson employed electrolysis of the chloride prepared from dolomite.

Current production of magnesium is in excess of requirements, and stocks on hand are said to be sufficient to meet two months' needs at the present rate of consumption.

Two California Gold Mines Will Reopen

The Idaho Maryland and the Empire Star mines, Grass Valley, Calif., were permitted to resume limited milling of ore by a WPB Mining Division order issued on March 23, an action taken to protect these mines against severe, unwarranted loss, and damage occasioned by their shutdown under WPB order L-208, the gold-mine closing order.

Through arrangements made by the San Francisco Chamber of Commerce and representatives of the American Mining Congress, J. Reed Lane, WPB deputy director for mine production, and A. G. Keating, WPB regional mining representative, made a two-day trip through several California gold mines between Grass Valley and Jackson, on the Mother Lode. Their report on conditions as they observed them was forwarded to Washington, where the decision reopening the two mines was made.

The Idaho Maryland operators reported that in 1943 the company suffered a loss on maintenance work of \$341,000, and that even this expense did not prevent serious damage to the mine's drifts. The limited operation permitted Idaho Maryland and the Empire Star will enable them to finance adequately this required maintenance work.

The WPB mining division stated that this grant does not amend or relax any section of L-208, but it does indicate that the WPB policy will be to give consideration to appeals from properties whose production records are proved and whose economic value to the region is clearly shown.

Gold Brings High Price In Chilean Auctions

In January this year, the first auctions of gold were held in the Santiago and Valparaiso, Chile, stock exchanges, in that country's first attempt to combat rising currency inflation, as reported in *E.&M.J.* for February, 1944, p. 116. Briefly, the plan was to collect in the Chilean mint all bar gold produced in the country and to have returned to it all gold sent out with other metals; and then to auction the gold

regularly. Payment for the gold would be in the paper currency which the government desires to retire from circulation, and gold minted into 100-peso pieces would be given in return.

The Santiago correspondent of *E.&M.J.* reports that in the first auction in Santiago, 920 oz. of gold was sold at \$51.50 per ounce. In the second auction in January, 257 oz. was sold at \$48.20 per ounce; and in the third, 203 oz. brought \$45.90 per ounce. Total for the month was 1,380 oz. at an average price of \$50.08. The average price in Chilean pesos per gram was 52.22; therefore the government tax amounted to 2.16 pesos per gram and the producers received 50.06 pesos per gram on the 42,820 grams sold.

In February four auctions were held, and both the amounts sold and the prices paid increased a little over the final January auction, and held steadier. Total for February was 2,733 oz., which sold for \$127,200, or \$46.51 per ounce. The government tax was 0.59 pesos per gram on the 85,119 grams sold, and the producers received 46.37 pesos per gram. The tax was fixed at 30 percent of whatever the gold brought in excess of 45 pesos, although the tax would have risen to 50 percent if the price had gone above 60 pesos.

This showing in the first two months was, on the whole, disappointing to those who conceived the plan. The price paid exceeded the previous black-market price of gold in Argentina and Brazil, which had been hanging around 43 Chilean pesos, but many informed observers doubted the capacity of the local markets to absorb heavy sales of gold at anything like prices in the first auctions, when only relatively small quantities of gold were sold. It had been hoped by these sales of gold to redeem a large part of the 1,400,000,000 pesos in paper currency now held by the Chilean public, but the plan is off to a rather slow start considering the size of its objective.

The amount of gold available each month can be calculated as follows: the total annual production of gold is about 193,500 oz., of which 48,200 oz. is in the form of bar gold left in the country. There is exported, then, about 145,300 oz. in ore and concentrates, of which 25,700 is contained in blister copper from Andes Copper Co., leaving 119,600 oz. that can be returned under the agreement with the U. S. Treasury. This means that about 10,000 oz. per month would be available for the auctions, or about 3.7 times the amount sold in February. The question arises: when gold returns from the States are operating fully at the 10,000 oz. per month rate, can the local market absorb this quantity at a fair price?

In considering the dollar price of gold in Chile, it must be remembered that the exchange rate of 31 pesos to the U. S. dollar is artificially high. Under freely functioning economic laws, the number of pesos obtained for the dollar or pound sterling would be higher. By keeping the exchange at 31 pesos, the Chilean government helps to keep the cost of living down, but exporters, and this means miners, who furnish 85 percent of Chile's exports, are footing the bill.

Uncertainty Permeates Bolivian Tin Industry

With a large part of the purchases of Bolivian tin concentrates now being conducted on a day-to-day basis, and with no assurance of what the future may hold, Bolivian tin producers find themselves increasingly uncertain as to their position. Many Metals Reserve contracts for Bolivian tin have expired and many are closely approaching their termination date, yet nothing has as yet materialized regarding renewal of these contracts.

Negotiations started several months ago between Bolivian producers and the OEW, now the Foreign Economic Administration, and it was hoped that an upward adjustment of prices paid for Bolivian tin could be secured. With the change in Bolivian government on Dec. 20, 1943, however, negotiations came to an abrupt halt, and there is no sign of their being renewed.

Some time ago Metals Reserve Co. offered Bolivian producers an increase in the price of tin from 60 to 63½c. per pound. This proposition was not accepted, because some producers felt that they could eventually obtain 65c. The situation, as it has stood since Dec. 20, is that Metals Reserve is continuing to buy tin ores and concentrates at the old 60c. price, but that each shipment is settled for separately, and no contracts are being made covering future shipments. According to the FEA, "this is a temporary arrangement that could be suspended at any moment."

Exports of metals and concentrates from Bolivia last year reached relatively high figures, as shown in the following table:

	Concentrates	Metal Contained
Tin	88,567	40,959
Tungsten	6,700	4,141
Antimony	29,953	17,973
Copper	14,774	6,011
Lead	18,621	11,387
Zinc	36,820	21,074

Texas Steel Plant Under Construction

Now under construction at Daingerfield, Tex., the iron-ore beneficiation plant of Lone Star Steel Co. may have considerable bearing on similar plants that will one day have to be built in the Lake Superior region. The plant was designed and is being constructed by Chemical Construction Co., of New York, and makes use of heavy-media separation, as well as washing, calcining, and sintering, in order to produce a suitable blast-furnace feed.

Ore treated in the plant will contain limonite and siderite, and will be mined from the nearby Weches greensand, a member of the Mount Selman formation of early Tertiary age. Ordinary strip mining methods will be used, with 2½-yd. diesel shovels and 15-ton trucks handling the ore. The concentrator will produce

about 6,000 tons of blast-furnace feed daily.

Along with the beneficiation plant, there are being constructed a blast furnace, coke ovens, a byproducts plant, and a power plant. The furnace will produce about 1,200 tons of pig iron daily. Coal used will come from nearby sources in Oklahoma.

Anaconda's Miners Will Sacrifice Vacation

It was reported recently from Butte, Mont., that employees of Anaconda Copper Mining Co. in Montana had notified D. M. Kelly, vice president of the company in Butte, that they would be willing to forego this year the vacations to which they are entitled, in order to maintain full production of copper. This action was taken by representatives of both the CIO and the AFL unions representing Anaconda's employees. According to the company, the men will receive vacation pay in addition to regular wages during the time they would otherwise be on vacation.

Your Help Requested to Protect Children

Blasting caps found by children are likely to be converted into playthings, with tragic results. Last year more boys and girls were injured by blasting caps than in 1942, despite efforts to protect them by many agencies throughout the country. The Institute of Makers of Explosives, 103 Park Ave., New York, N. Y., asks the cooperation of the members of the mining industry in reducing or eliminating this needless suffering of so many children.

This can be done in two ways. First, see to it that no blasting cap is left in, or carried to, a place where children can get at it. This is a point to be watched, particularly in small operations. Second, by means of posters and lectures in schools, libraries, and plant buildings, convince children and their parents of the dangers involved in a child's playing with blasting caps. Suitable posters and leaflets may be obtained without charge from the Institute.

MMSW Wins Two WLB Elections in West

Early in March it was announced that Mine, Mill, and Smelter Workers locals had won Labor Board elections at the Phelps Dodge Copper Queen mine, at Bisbee, Ariz., and the Arthur and Magna mills of Utah Copper Co.

The election at the Copper Queen covers about 1,100 workers. The vote was: MMSW, 611; AFL, 239; UMW, 100; no union, 7. At the Arthur and Magna mills, the vote ran: MMSW, 441; AFL, 18; no union, 335.

The MMSW reports that on the day

preceding this election in Utah, the union received a letter from D. D. Moffat, president of Utah Copper Co., saying that the company was ready to bargain with the union on a contract covering employees at the Bingham pit, where the MMSW won an election last year.

It was also announced that miners at Mine La Motte Corp., a subsidiary of St. Joseph Lead Co. near Fredericktown, Mo., had been granted by the WLB a wage increase of \$1 per day and retroactive pay totaling more than \$1,250,000. This wage increase had been promised the miners some time ago by the company, contingent upon WLB approval. MMSW Local 648 won an election at Mine La Motte last Dec. 9 by a vote of 1,981 to 750.

Kennecott Operations At Record Level

Production of copper by Kennecott Copper Corp. in 1943 exceeded all previous records, totaling 1,274,577,957 lb., against 1,264,761,701 lb. in 1942, the annual report of the company states. An interesting sidelight on this record is the fact that approximately 20 percent of all Kennecott's employees in the United States are women. They find work in increasing numbers in factory jobs, but they were used for the first time in 1943 in concentrators and open pits at two Kennecott properties.

E. T. Stannard, president of the company, stated in the report that he believes world production of virgin copper in 1943 was about double that of the peak years of the last war, 1917 and 1918, which averaged about 1,575,000 tons. In those years, the United States contributed slightly more than 60 percent of the world total, whereas in 1943 it furnished somewhat less than 40 percent.

Bell System May Spend Billion on Postwar Work

The construction program of the American Telephone & Telegraph Co. for the first few years after the war may well prove to be the largest ever undertaken by the system, according to the annual report to its stockholders. To restore plant margins and to carry out plant improvements suspended because of the war, it is estimated that the company is faced with postwar expenditures of more than a billion dollars, spread over several years. Metal products will account for much of this expense.

St. Joe Lead Output Declines Moderately

St. Joseph Lead Co. mined 7,476,873 tons of ore in 1943, against 7,674,941 tons in 1942, according to the annual report to stockholders. Pig lead equivalent obtained from domestic mine operations was

165,584 tons in 1943, 179,602 tons in 1942, and 149,035 tons in 1941.

Net income for the year was \$4,033,973.90, against \$5,655,625.61 in 1942, after allowance for depletion, depreciation, and payment of taxes. The decline was attributed by Clinton H. Crane, president, to lower production, higher wages, increased cost of all supplies, and a drop in efficiency of operations generally, due to replacement of experienced workers by those of less experience.

Scrugham Bill Opposed By West Coast Group

The West Coast Mineral Association, George H. Waterman, president, with headquarters in Seattle, Wash., has recently announced its opposition to the Scrugham stockpile bill, S. 1582, even though its members regard it as an improvement over the original version of the bill, S. 1160. The group approves that part of the bill dealing with the first postwar year, but differs with the methods proposed in the bill for handling mineral production thereafter.

The Scrugham bill proposes paying domestic miners, following the first postwar year, prices up to the full import price, duty paid, plus 25 percent. This subsidy of domestic mines, the Association believes, would be undesirable because it would deplete domestic reserves and would make the domestic mining industry dependent on the government. Rather than perpetuate present agencies, or create new ones, to handle stockpiling, the Association believes that it would be preferable to allow Congress to enact appropriate legislation, based on recommendations of the Bureau of Mines and other similar agencies, to empower the War and the Navy departments to supervise stockpiling.

E. & M. J. Subscribers Please Note

Is your subscription to *Engineering and Mining Journal* about to expire? Do you want to insure uninterrupted receipt of the *Journal*? If so, please do not fail to renew your subscription before expiration. The number of copies of *E. & M. J.* that may be printed is limited by WPB orders curtailing the use of paper. At present it is impossible to fill promptly all new subscriptions, and there is a waiting list of substantial proportions that can be accommodated only as fast as present subscriptions expire. If you want to insure the continuity of your subscription and avoid the embarrassment of joining the waiting list, please pay attention to the publisher's notices, and renew before expiration.

NEW BOOKS

A STEEL MAN IN INDIA. By John L. Keenan—Lenore Sorsby collaborating; with an introduction by Louis Bromfield. Duell, Sloan & Pearce, Inc., New York. Pp. 224; 8 by 5½ in. Price \$2.50.

Mr. Keenan's quarter century of life and work in India at the Jamshedpur mills of the Tata Iron & Steel Co., the largest steel plant in the British Empire and the tenth largest in the world, forms the source material for a sprightly and an informing book. The author knew how to make statistics interesting, and as a teller of tales—some a bit tall—he rated high. Blended into his record of the achievements of the Tata organization are shrewd and philosophic conclusions respecting the religious, ethnic, political, social, and industrial phases of the problems that beset the great land of India. Mr. Keenan held the peoples of that country in sincere regard and affection. He envisioned an end to the concept that "East is East and West is West, and never the twain shall meet."

(A cable dispatch reaching the United States in February contained the announcement that Mr. Keenan had died in China while on a mission for the State Department, as recorded on page 124 of the February issue of *E.&M.J.*—Ed.)

THE MONETARY STANDARDS INQUIRY. A series of pamphlets available free in single copies from The Monetary Standards Inquiry, 408 Graybar Building, New York 17, N. Y.

This series, all of recent date, presents in concise, readable form the views of outstanding economists on monetary problems. Titles so far issued are as follows:

No. 1. "The Need for a 'Settler' of Balances in International Payments," by Amos E. Taylor. Pp. 16. This pamphlet shows that international trade cannot function in a modern, democratic way without some universally prized substance, such as gold, to settle international balances.

No. 2. "American Banking and Currency Stabilization," by E. E. Agger. Pp. 28. After calling attention to the circumstance that international and domestic currency stabilization controls tend to upset each other, the author discusses the gold standard, bimetalism, and managed currencies. He advocates participation in international stabilization, but the retention of a considerable measure of national independence.

No. 3. "Fundamentals of International Monetary Policy," by Dr. Frank D. Graham. Pp. 32. After a discussion of the relationships between national and international stabilization policies, the author advocates a gold-silver-commodity base for currency, administration of the same to

operate for stability of both currency and national economy. He flouts the Keynes and White plans as unworkable.

No. 4. "Latin American Postwar Monetary Standards," by Chas. A. McQueen. Pp. 23. The author discusses the history of Latin American currencies and banking systems, and concludes that Latin Americans will be sympathetic to monetary policies based on established practice and will cooperate in reasonable measures to stabilize international currency relationships. The position of gold is strong; that of silver is doubtful, except for coins, unless something is done to stabilize silver values.

No. 5. "Near Eastern Postwar Monetary Standards," by Elgin Groseclose. Pp. 14. The writer makes a strong case for silver as the rational money for the Near East. He believes that official attitudes, relatively indifferent to silver, do not reflect the popular will in this respect.

No. 6. "Far Eastern Postwar Monetary Standards," by Dickson H. Leavens. Pp. 24. After briefly discussing the currency histories and trade of each Far Eastern country, the author visualizes most of the Far East as likely to go on exchange standards based on holdings of securities of countries having strong currencies. Few Far Eastern countries will have enough gold to go on a direct gold standard. American habits of political meddling with silver values are considered a barrier to the reestablishment of silver as a monetary base, despite the strong leaning of the people toward the metal.

No. 7. "Alternatives in Postwar International Monetary Standards," by Walter E. Spahr. Pp. 23. A strong case for the reestablishment of the gold standard with maximum redeemability. The author is skeptical of the Keynes and White plans and suggests holding any international accord to a clearing-house basis.

APPLIED SAFETY ENGINEERING.

By H. H. Berman and H. W. McCrone. McGraw-Hill Book Co., New York and London. Pp. 189. Price \$2.

The authors have been educating potential safety engineers at the University of Maryland. Mr. Berman is safety engineer for the Consolidated Gas, Electric Light & Power Co., of Baltimore, and Mr. McCrone is field engineer for the Baltimore Safety Council. In their opinion, what safety engineers need is more practical knowledge, more of the "how" of safety engineering in addition to the "what" and "why." Hence in their book the subject is presented on a modified case basis, following half a dozen cases through investigation reports, writing rules and regulations, composing safety messages, and holding safety conferences. An appendix contains 25 sample accident cases.

SURVEY OF MINES, 1944, CANADA AND NEWFOUNDLAND. The Financial Post, MacLean Publishing Co., Ltd., Montreal and Toronto, Canada. Pp. 224. Price \$2.

In the 18th edition of this standard reference work on Canadian mines, the reader will find a reflection of changes in the industry caused by the war. A distinct shift in interest to gold mining is observable, and evidenced by an increasing number of gold prospectors in the field during 1943. With diminished emphasis on base-metal mining after the war, a revival of gold mining is expected.

The directory contains the customary detailed descriptions of, and information about, thousands of active Canadian mines, together with tables on mineral production and 18 maps of the principal mining areas, new and old.

PUBLICATIONS RECEIVED

Barry Lake Area, Abitibi County and Abitibi Territory. Geological Report No. 14, Quebec Department of Mines, Pp. 25.

Gypsum Industry in Canada, 1942. Dominion Bureau of Statistics, Ottawa, Ont., Pp. 11. Price 25c.

Feldspar and Quartz Mining Industry in Canada, 1942. (Including data relating to nepheline-syenite.) Dominion Bureau of Statistics, Ottawa, Ont. Price 25c.

Automotive Vehicle Maintenance. Bulletin entitled "Cooling System: Cleaning, Flushing, Rust Prevention, and Anti-freeze." Prepared for Office of Defense Transportation by Society of Automotive Engineers, Inc., Government Printing Office, Washington, D. C. Pp. 26.

Eocene of Virginia. Bulletin 57, Virginia Geological Survey, University, Va. Pp. 43.

"The Foreman—Key Man in Your Plant." A 16-page pamphlet published by Industrial Relations Policy Committee of National Association of Manufacturers, 14 West 49th St., New York. Contains a "check sheet" of recommended procedures in the supervisory field which management is urged to follow. Single copies free; quantities at cost.

Nevada's Metal and Mineral Production (1859-1940 inclusive). By B. F. Couch and Jay A. Carpenter. Bulletin 38. Nevada State Bureau of Mines. Pp. 159. Price 50c.

Mineria Boliviana. No. I, Vol. I. Managing Director, Guillermo Bilbao la Vieja. Published by Instituto Boliviano de Ingeniería de Minas y Geología, LaPaz, Bolivia. A new monthly publication.

(Continued on page 152)

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PERSONAL NEWS

G. M. Humphrey, president of the M. A. Hanna Co., Cleveland, Ohio, announces that the Lake coal, iron, ore, dock, and vessel departments have been consolidated into one division under the direction of J. H. Thompson, vice president. In the iron-ore department H. L. Pierce has been promoted to the position of executive vice president of the various iron-ore mining subsidiaries, in charge of mine operations and sales.

A. C. Freeze has been elected chairman of the Kimberley Branch of the C.I.M.M., which was recently organized by the members of the technical staff of the Sullivan mine and mill. D. A. York is vice chairman; E. G. Trapp, secretary; F. E. Burnett, treasurer; C. F. Myrene, mine councillor; and Arvid Thunaes, mill councillor.

A. W. T. Freakes is Lieutenant Commander and executive officer of the 116th Naval Construction Battalion, U.S.N.R., San Francisco, Calif. Before entering the service he had worked as field geologist for the British South Africa Co., in Northern Rhodesia, and later as manager of the Lucky Shot mine, in the Willow Creek district of Alaska.

Lewed L. Jessen has retired from the management of Boyles Bros. Drilling Co., Ltd., and is residing at Westerlec Farm, Banford Road, R.R. No. 2, Gloverdale, B. C.

Lic. Alberto Terrones Benitez, of Mexico City, Mexico, recently visited the city of Durango to confer with operators of the states of Durango, Zacatecas, and Chihuahua who are suffering from the crisis caused by the sharp decline in the prices of strategic metals, mercury in particular. This results from the decision of Metals Reserve Co. to discontinue buying. Mr. Terrones states that it is likely that most of the quicksilver operators who are financing their ores will have to shut down. Those who are operating concentration-flotation plants may survive if costs can be adjusted. Mr. Terrones ventures the opinion that as a result of this crisis the government may readjust the taxation on mineral production.

Francis M. Shore, chief of the economics and statistics service of the U. S. Bureau of Mines, retired on Feb. 29 after completing more than 42 years and 7 months with federal agencies. He joined the Bureau staff in 1926, and has just celebrated his 70th birthday.

Clarence A. Bjork has been appointed assistant superintendent of Montreal Mining Co., which operates a large underground iron mine at Montreal, Wis.

Willard A. Cole, of the U. S. Bureau of Mines staff at Duluth, Minn., has been transferred to Charlottesville, Va., to as-

sume charge of the Bureau's mine development work in the State of Virginia. Jacob A. Stampe, also formerly at the Bureau's Duluth office, has been transferred to State College, Pa., to assume charge of Bureau mine development in Pennsylvania.

E. M. Lindenau, Silver Spring, Md., has returned to Estacion Moraya, Bolivia,



E. M. LINDENAU

where he is manager of the Pampa Grande and Santa Rosa lead mines of Mauricio Hochschild, S.A.M.I.

A. E. Pugsley has been appointed manager of Hasaga Gold Mines, Ltd., operating in the Red Lake region of Ontario. He is a graduate of Queen's University (1933) and was for nine years superintendent, and later manager, of Paymaster Consolidated Mines. Since 1942 he had been associated with the Canadian government projects related to the war.

Sherman Briscoe, Commerce, Okla., forman at the Webber mine of Eagle-Picher Mining & Smelting Co. near Picher,



SHERMAN BRISCOE

in the Tri-State district, recently won commendation for his part in rescuing two fellow workers who had been injured by a

premature explosion while blockholing boulders in the Webber No. 1 mine. Hearing the unscheduled blast, Briscoe ran to the working place and helped one of the men to safety. Then, despite his knowledge of the 17 lighted fuses burning toward their charges in the room he had just left, Briscoe returned for the other man, and got him out just before the remaining shots went off. Both injured men suffered the loss of one eye in the accident.

A. T. Koenen, formerly mill superintendent for Golden Manitou Mines, Ltd., in Quebec, is now superintendent for Ancor Corp., Box 565, St. George, S. C.

R. DePassey has become assistant metallurgist for Lake View & Star, Ltd., at Kalgoorlie, Western Australia, for the duration of the war.

E. M. Mundle has been appointed general manager of Goldfields Australian Development Co., Ltd., which controls the Moonlight, Wiluna, and Mt. Ida mines, in Western Australia.

L. D. Anderson, consulting engineer for the Potash Company of America, will change his status from a full-time to a part-time basis and will devote some of his attention to outside consulting work.

John Westwater, of Ishpeming, Mich., has been made assistant superintendent of Princeton iron mine, at Gwinn, Mich. He was formerly on the staff of Chile Copper Co.

Raymond Segar, a mining engineer of Hibbing, Minn., has been made assistant superintendent of the Leonard-Burt open pit and the Godfrey-Morris underground iron mine on the Mcsabi.

A. A. Kuzmin, L. M. Veronin, and M. Borisov, mining and metallurgical engineers of the Soviet Union, visited the Gogebic Range during the first week of March. They were accompanied by A. Milensky, of New York City, and C. L. Kohlhaas, of Duluth.

Lionel E. Booth has resigned as director and vice president in charge of metallurgical operations of the Galigher Company, and will engage in private practice as a consulting engineer on ore treatment problems under the firm name of Booth Engineers. Offices and laboratory have been established in the McCormick Bldg., Salt Lake City, 1, Utah.

Arthur W. Burgren, mining engineer, who has recently been engaged in war work, has moved from Mt. Eden, Calif., to 1555 D St., Hayward, Calif.

C. E. McManus has become chief engineer for Butler Brothers Minnesota iron-mining operations.

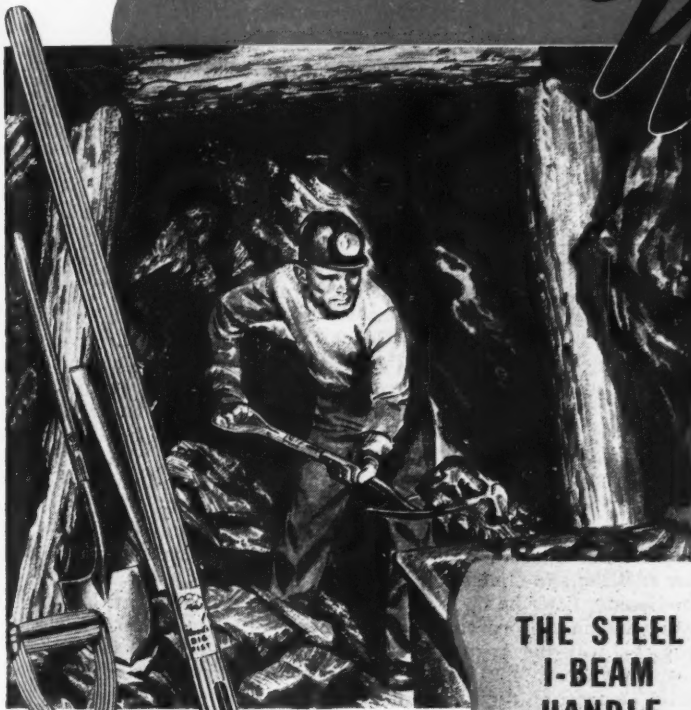
F. W. McQuiston, Jr., returned recently to Grass Valley, Calif., from Leadville,

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Colo., where he had been connected with the Resurrection Mining Co., as consulting metallurgist.

Robert E. Crockett, authority on ore beneficiation and with a wide consulting experience, has associated himself with H. A. Brassert & Co., consulting engineers to the iron and steel and affiliated industries. Mr. Crockett has been chairman for the past six years of the Eastern Magnetite Mining and Milling Committee of the A.I.M.E. and has been in charge of various properties in the Eastern magnetite field for many years.

John A. Bowsher has been transferred from the Mineral Production Security Division, U. S. Bureau of Mines, Vincennes, Ind., to the Mining Division of the U. S. Bureau of Mines as project engineer with headquarters at Austin, Tex. For the next six weeks to two months he will be in charge of mica exploration in Hudspeth and Culberson counties. His office will be at Van Horn, Tex.

Thomas G. Murdock, formerly assistant chief engineer of the Brazilian Mica Program of the Foreign Economic Administration, has been appointed executive manager, Inter-American Safety Council, Inc., 12 Rector St., New York 6, N. Y.

Ben F. Hill, mining engineer and geologist, has been named to succeed the late Fred C. Carstarphen as consulting engineer for the Golden Stars Mining Co., Cripple Creek, Colo.

Harold Lakes, prominent mining engineer from the Kootenay district in British Columbia, was reelected recently as president of the Chamber of Mines of Eastern British Columbia at the Chamber's annual meeting held in February in Nelson, B. C.

Obituaries

Professor Benjamin Leroy Miller, former head of the department of geology at Lehigh University, Bethlehem, Pa., died at the university on March 23. He was 69, and had been a member of the faculty there for 37 years.

James L. Fozard, general manager of Mammoth-St. Anthony, Ltd., at Tiger, Ariz., formerly in charge of Beatson Copper Co. in Alaska, died on Feb. 29.

R. J. Walter, oldest mining and metallurgical engineer in Colorado, died in Denver on Feb. 23 last. He was born in St. Louis, Mo., on July 6, 1860, and went to Leadville, Colo., in 1878. At the time of his death he was senior member of R. J. Walter-A. S. Walter, consulting mining and metallurgical engineers. The senior Mr. Walter was at the inception of nearly every mining camp in the West from Leadville to Goldfield, Nev., where he was superintendent of a number of mines, mills, and smelters. In 1884 he was awarded first prize gold medal for the best displays of gold and silver ores at the International Mining Exposition held in Denver, Colo., from 1881 to 1884.

Edgar W. Vivian, a mining engineer well known in the Mesabi iron country and associated professionally with Pickands, Mather & Co., died on March 1 at the age of 49.

Robert Andrew Elliott, general manager of Deloro Smelting & Refining Co., Ltd., died recently at Deloro, Ontario, Canada, at the age of 58. He was a past president of the Association of Professional Engineers of Ontario and a member of the Canadian Institute of Mining and Metallurgy.

Criss W. Tremper, 76, of Alaska gold rush days, died at Kingsburg, Calif., on Feb. 12. He was one of the heroic rescuers who recovered the bodies of 70 men who perished in the Chilcoot Pass snowslide in the spring of 1898. He discovered gold on Glacier Hill, near Nome. When he heard claim jumpers were coming to put him off his property he wrapped a bundle of rifles in with shovel handles and when the jumpers arrived they were met by a volley which killed one of their number.

William M. Snow, mining engineer, died in Phoenix, Ariz., March 10. Born in Moscow, Idaho, in 1882, he graduated from the University of Idaho in 1906. His first position was that of engineer and assayer for the Gold Hunt Mining & Smelting Co., at Mullan, Idaho. For a number of years he practiced his profession in Idaho and Montana and served as a member of the state legislature in Idaho as a representative from Lemhi County. Later he operated in New Mexico and in Arizona and for a time was associated with the Arizona Testing Laboratories in Phoenix. In 1939 he became consulting engineer on the staff of the Reconstruction Finance Corporation in Arizona and in 1942 supervisor of metal reserves for the RFC in Arizona.

George F. Munroe, a sales engineer for The Dorr Company, with headquarters in El Paso, Tex., died in Denver on Feb. 28.

Fred H. (Cap) Nesbitt, of Webb City, Mo., popular machine-gun company commander in the famous 35th Division in the first World War, who for several years had been connected with the ore-loading department of the Eagle-Picher Mining & Smelting Co., died March 12 in Joplin, Mo. He was 66 years old. For several years he was connected with the Tri-State Zinc & Lead Ore Producers' Association in the Picher area, being active in the organization's accident-prevention campaign in the mines.

Bud Huertler Jacob, 54 years old, manager of the metals sales division of the Eagle-Picher Mining & Smelting Co., died March 5 in Joplin, Mo. He had been with the company since 1917, formerly serving with the Eagle White Lead Co.

George L. Walker, British journalist of Epsom, Surrey County, England, who for many years has been a valued and conscientious contributor to the foreign news pages of *Engineering and Mining Journal*, died at Epsom on Feb. 23 of this year.

Dr. H. A. Buehler, of Rolla, Mo., State Geologist since 1908, died on March 14 at Jefferson City. He was 67 years old. He had been an ex-officio member of the State Highway Commission since the passage of the centennial road law in 1921. Through his long service as Missouri's chief geologist, Dr. Buehler not only was known widely throughout the State, but he was known affectionately as Chief Buehler to geologists and mining men of the mineral industry throughout the nation. He was keenly interested in the early development of the Tri-State mining field, and, as one of its staunchest backers, had many friends in the district. He was a graduate of the University of Wisconsin, a past president of the American Institute of Mining & Metallurgical Engineers, and an active member of other engineering and professional societies.

Lewis Kenneth Jacobsen, Colorado district engineer of the U. S. Bureau of Mines, died on March 3, 1944, at the age of 47. He was born in Salt Lake City, Utah, Nov. 19, 1896. He received the degree of bachelor of science at the University of Utah in 1924, and a master of science degree in metallurgy in 1925 from the same institution. He was a member of the A.I.M.E. and the Australasian Institute of Mining and Metallurgy, Inc. After graduation, Mr. Jacobsen was employed by the General Engineering Co., and later by the Utah Apex Mining Co., at Bingham Canyon, Utah. He left Bingham Canyon to accept the position of chief metallurgist and mill superintendent for Mt. Isa Mines, Ltd., at Mount Isa, Queensland, Australia. After remaining at Mount Isa for 15 years, he was forced to return to the United States by the outbreak of war in the Pacific. In 1942, Mr. Jacobsen became associated with the U. S. Bureau of Mines, and was appointed district engineer for Colorado. He organized the Colorado district office.

Letters

For Early Development Of South America

The Editor:

MODERN CIVILIZATION is based on the extent to which a people has developed its natural resources. Minerals were the first natural resources to be put to use in the rise of civilization; hence mining men or mining engineers may be considered the leaders in this civilization. The United States has furnished such leaders in all parts of the world: John Hays Hammond, W. W. Mein, Richard A. Parker, and many others in South Africa; Herbert Hoover, W. J. Loring, and many others in Australia, the East Indies, and Asia, while scores of our profession have opened mines in Spanish-American countries. Most of these men have been employed by companies which paid them well for their services, but there are many individuals like William Braden, John W. Mercer, and Charles Butters, who have done a

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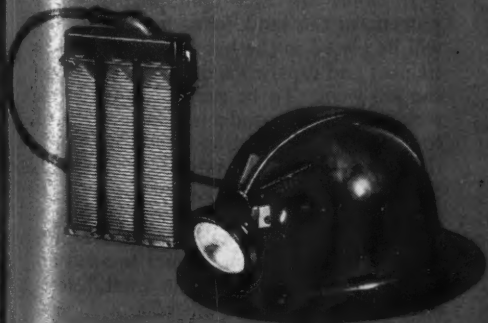
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great deal to advance modern civilization in South America.

Having been operating in South America since 1923, I am convinced that the development of the natural resources of these countries will be more easily accomplished by individuals opening up the smaller properties, some of which will develop into large mines like Braden, Chuquicamata, or Cerro de Pasco. Many of them will be large enough only to establish small camps or villages, where a few mining engineers could teach the people how to use modern machinery and introduce the modern conveniences of our homes.

Venezuela, Peru, Chile, and Brazil are opening iron mines with the aim of establishing a steel industry. Every country in South America has gold, and most South American countries have other minerals, and oil deposits are known to exist throughout most of South America. And there is more undeveloped but easily developed hydroelectric power in South America than in any other part of the world.

There is an area of approximately 2,000,000 square miles of undeveloped rich agricultural land in the Amazon Basin between the high mountains and the flooded areas of the lower Amazon, 350,000 square miles in Peru, 350,000 in Bolivia, 300,000 in Colombia, Ecuador, and Venezuela combined; 1,000,000 in Brazil, while Paraguay and Argentina still have large areas of food-producing land. When the war is over half of the people of Europe will want to emigrate; also large numbers of people in North America who do not want to become laborers in an industrial civilization will want to go to South America to establish homes.

Production of minerals is not increasing in the United States, and within 20 years we will have developed all our electric power, so it is only logical that if the Western Hemisphere is to continue growing, our population must spread to South America. It is fitting that we who have helped in the rapid growth of North America during the last 50 years should now give some thought to the "Good Neighbor Policy," and try to do what we can to develop the countries south of us, not only for their sake but also for ours. This development may prevent another war, for peoples who own their own homes and can see a future for their children are not prone to go to war.

There are several thousand men in the mining, manufacturing, and agricultural industries in Spanish America, and if each of us will do all he can to let the facts be known as to the natural resources and the means by which they can be developed, I am sure South America will grow as fast in the next 50 years as North America has in the last.

If the Americas are to be for the Americans, it is up to the Americas to work together as good neighbors and in a practical way. This vast undeveloped area can feed a thousand million people and furnish all the natural resources they will need. Inasmuch as the descendants of the Incas, who live in the high Andes, have about 25 percent more lung capacity than we have, they cannot live in the lower areas of the Amazon Basin or east of the Andes,

so it is necessary for people from other parts of the world to make their homes in this area if these natural resources are to be made available to civilization.

I suggest that we all unite in making available the facts, and aid in every possible way the opening of mines, lines of communication, farming areas, and manufacturing plants wherever they are needed in any part of the Spanish America.

We cannot save our way of life by protective tariffs; neither can we expect to make use of the cheap labor of Asia or the Indies; nor can we continue to be a manufacturing and exporting country when our rate of wages is so much higher than that of the people in the countries to which we hope to export. This is a mechanical age, and if we will unite in introducing this age into this vast undeveloped area of South America, we can save our way of life and have the "Americas for the Americans."

CLARENCE WOODS

Los Angeles, Calif.

Elephants in Elephant Country

A plea for systematic prospecting on a national scale

The Editor:

DURING THE DULL THIRTIES, when many of the common metals were a "drug on the market," little thought was given to the probability of the early depletion of many of our mineral reserves. Since the beginning of the present world conflict, however, mineral production has reached such an unprecedented rate that attention has been sharply focused on the diminishing supply of many of our metals. The end of many of the large porphyry coppers is definitely in sight. Numerous large lead and zinc deposits have been exhausted, and many others are rapidly reaching total depletion. Viewed in the light of the almost complete lack of important discoveries in the past 25 years, the situation becomes somewhat alarming.

Since the beginning of mining in the West, the industry has depended almost entirely on the efforts of the prospector for the finding of new deposits. These efforts have always been haphazard, unsystematic, and unscientific. For more than 90 years, the mountainous regions of the eleven western states have been literally combed by thousands of prospectors. As a result of their physical and financial limitations and their haphazard methods, only the obvious surface occurrences of minerals have been discovered. A few of the less obvious and deeper-seated deposits were discovered by diamond drilling and by costly underground development work.

Almost without exception, the few recent discoveries that have proved of importance have been made as the result of chance or accident. The largest mercury producing mine in Nevada, for instance, was discovered sometime in the past decade by Basque shepherders while tending their flocks.

Only one discovery was made as a result of all the public funds that were spent by government agencies on an exploration program that was started in 1939. This was a tungsten discovery and was made accidentally by a geologist of the U. S. Geological Survey while examining drill cores from an antimony drilling project. The exploration program here referred to was for the purpose only of appraising the value of deposits already known. Much of the work, although costly, did little more than confirm the tonnage estimate made by earlier but much less costly investigations.

Obviously, the nation cannot depend on such erratic exploration methods indefinitely. Prospecting must sooner or later be conducted in a systematic and scientific manner, and on a national scale. Geological information must be used to the utmost and every known practical and scientific device for finding deposits at depth must be employed. The role of the prospector will be more important than ever before, but his efforts must be directed, and the results of his findings recorded and correlated by competent geologists and mining engineers of broad experience.

The large mining companies could not undertake a program of this kind unless the cost could be liquidated by the government; otherwise the capital would have to come from profits, which are already taxed to the breaking point. Politically controlled government agencies have, by their past performance, proved themselves incapable of conducting such work properly. The policies of such agencies are too often dictated or at least influenced by Congressmen, Senators, and Chambers of Commerce. Under such circumstances, plans of geologists and engineers would be nullified, and the purpose of the program defeated. The net result would be a hopeless and useless boondoggling of public funds.

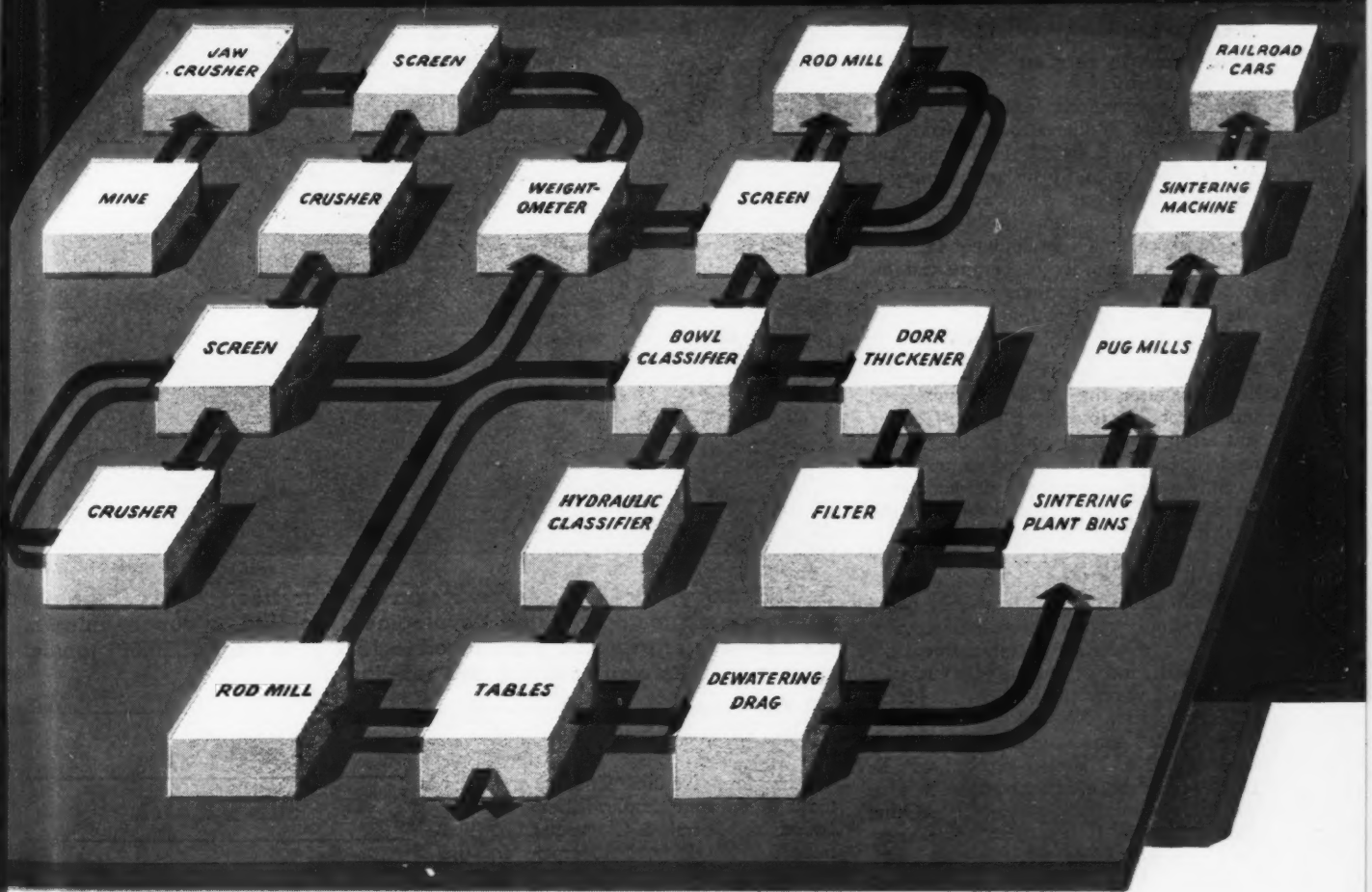
We have already gone far in providing the framework upon which to organize a comprehensive national program designed to search for surface and subsurface mineral deposits. Geologists and mining engineers have certain basic knowledge concerning the regional geological conditions that control mineral deposition. Our Geological Survey, through its long period of faithful service, has accumulated a wealth of geological and scientific data that could be used as a basis from which to work. The Survey, furthermore, has managed to steer clear of politics and keep its ranks free of political appointees.

If funds are ever appropriated for a program of this kind, let us hope that they will be placed in the hands of those whose training and experience qualify them to do the job well. To be successful, the work would have to be conducted without regard to state lines and district boundaries, and, therefore, without the interference of politicians. In searching for minerals it is only logical to search in areas that are known to be most favorable for their occurrence. When the time comes to send an expedition on an "elephant hunt," let's send it to "elephant country."

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REGIONAL NEWS

CALIFORNIA

Laco Mining Co. pushes development work — Woodside-Eureka gold mine to reopen

► Manganese mining continues on deposits in the Willits area of Mendocino County operated by G. F. Nygren and W. H. Watters, and plans are maturing to increase output as soon as road and weather conditions improve. The property has been under development for some time, and a quantity of commercial ore is available. The partners are also interested in other strategic mineral deposits in Placer County.

► Laco Mining Co., H. N. Mason, president, operating the Guadalupe quicksilver mine, near San Jose, Santa Clara County, is treating about 80 tons of ore in the modern Gould plant placed in operation recently. Active development work is in progress in the Kelly cut, the ore broken in this process furnishing about one-third of the furnace feed. The remaining two-thirds is obtained from a large dump a short distance from the treatment plant. Underground workings are accessible through a 47-deg., two-compartment incline shaft, and at present the mine is free from water to the 465-ft. level. Production from No. 1 level is expected to be started soon, and rehabilitation of sections of No. 2 level is planned. P. D. Burt, secretary of the company, is in charge of mining operations. Other officers include George Kirk, vice president; Howard Meade, treasurer; and L. M. Bennett.

► The well-known Woodside-Eureka gold mine, near Georgetown, El Dorado County, has been leased by the Romaine W. Myers interests, of Oakland, to S. T. Hilberg and associates, and the contract specifies that active work must be started by June 1, 1944. The property was worked on a large scale in the early days, and adjoins the Beebe mine, operated for several years by the Bradley interests of San Francisco. Hilberg plans to work the mine with a crew of veteran miners unfitted for war work.

► Industrial Metals, Ltd., is reported to be considering early reopening of the old Punch Bowl gold property, near Jamestown, Tuolumne County, acquired from Charles E. Shafer some time ago. The mine is opened by a 1,600-ft. tunnel, and holdings total 225 acres. The company is headed by V. M. Souza, and Addison N. Clark, consulting engineer, who examined the property, has been retained as resident manager.

► Mining operations are scheduled to be resumed soon at the Spanish mine, near



Photo from Three Lions

Behind the young baobab, or cream-of-tartar tree, can be seen the surface workings of Messina Development Co., Ltd., a copper mine in the northern Transvaal. It produced in 1938-39, a total of 10,801 tons of copper from its own smelting and refining plants

Washington, Nevada County, operated under lease from Bradley Mining Co. by Industrial Minerals & Chemicals Co. The mine is worked by the company for the production of barite, and remains closed during the winter months. L. N. Benson, superintendent, is in charge of operations. The Spanish mine had been, until 1939, the largest producer of gold, silver, copper, and lead in the Washington district.

► The Valley View mine, reopened last year with a RFC loan by Goodwin Trent, has been acquired by Seattle, Wash., interests, and increased operations are planned by the new owners. The property is near Lincoln, Placer County, and is said to contain a good tonnage of gold-copper-zinc ore. Development consists of a 170-ft. shaft and 400 ft. of lateral workings. Trent operated the mine under a lease from Superior Judge J. B. Landis, of Auburn.

► Westvaco Chlorine Products Co. is reported to have acquired a 25-year lease from A. E. Hamilton on 400 acres of dolomite holdings in the Cienega district of San Benito County. The property is known as the old O'Hara ranch, and adjoins the dolomite quarry currently worked by Hamilton. J. B. Perry is manager of mines for Westvaco.

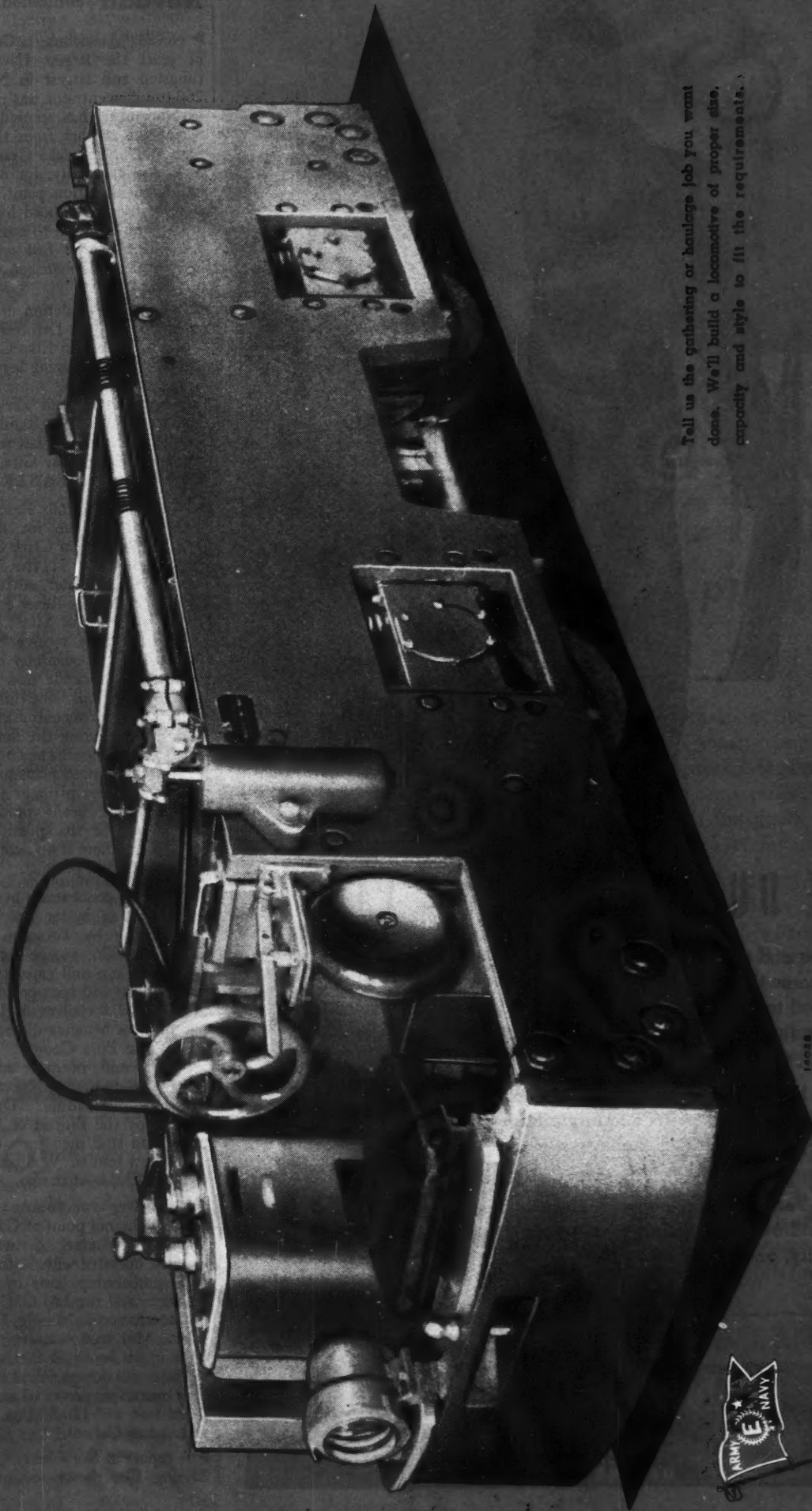
NEVADA

Greenan reports settlement on tin ore—Bradleys close Goldbanks—Jean stockpiling to end

► Production, curtailed to some extent by shortage of miners, continues at the 100-ton selective-flotation mill of Rip Van Winkle Consolidated Mining Co., in the Merrimac district, Elko County. Zinc concentrate is shipped to a Texas smelter and lead-silver concentrate to the Midvale smelter of A.S.&R. Co. George B. Thatcher, of Reno, is president, and L. S. Breckon, geologist for Utah Copper Co. at Bingham Canyon, Utah, is directing engineer.

► Because of the drop in the price of mercury, Bradley Mining Co., of San Francisco, has closed down its Goldbanks open-cut cinnabar mine, in eastern Pershing County, from which 400 to 500 tons of ore had been trucked monthly over 100 miles to the company's Opalite furnace plant across the State line in Oregon. O. L. Cash, manager at McDermitt, Nev., said the plant would be operated intermittently, as ore is available in the Opalite and nearby Bretz mine.

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Nevada (continued)

► Nevada-Massachusetts Co., for a number of years the largest U. S. producer of tungsten and largest in Nevada until its 260-ton concentrator was destroyed by fire in November, has secured the loan of a heavy-duty crusher from the 700-ton cyanide mill of Standard Cyaniding Co., also in Pershing County, for use at its 1,000-ton tailing flotation plant. This indicates the purpose, announced following the loss of the primary mill, to crush newly mined ore and treat the fine with the tailing. Ott F. Heizer is manager at the Mill City properties.

► Following completion of a new 25-mile access road to the Delno district, north of Montello in eastern Elko County, at a cost reported by the Grazing Service of \$34,500, lead ore containing some silver is being shipped from the old Cleveland mine by American Smelting & Refining Co., which acquired the property last summer. J. Fred Johnson, of Salt Lake City, is in charge at Montello under the A.S.&R. Utah division.

► Purchase by Metals Reserve Co. of oxidized lead-zinc ore for its stockpile at Jean, a rail point in Clark County, will be discontinued May 31, the agency has notified Jay A. Carpenter, advisory engineer in Nevada for Metals Reserve and director of the State Bureau of Mines. Established in January 1943 to receive ore from small mines in the Goodsprings district, 5 miles distant, the stockpile now contains more than 24,000 tons, one-third of which is tailing from concentrators operated at Goodsprings during the first World War. WPB several months ago ordered abandonment of announced plans to build a Waelz process lead-zinc plant at Jean, for which \$340,000 had been appropriated. Final disposal of the stockpiled ore presents a problem, as there is no demand at smelters for the oxidized product.

► Tungsten concentrate averaging 70 percent WO_3 or better has been produced continuously by Tungsten Metals Corp. since late 1936, except for a brief period in 1940, when mill capacity was increased from 100 to 150 tons per day. The mine, first worked for silver in 1869, is in the Shoshone or Minerva district, in southeastern White Pine County. During several years the mill, of most advanced design, was the second largest Nevada producer of tungsten concentrate. Drilling in late months by the Bureau of Mines was said by Bureau staff men to have given highly satisfactory results. William L. Trent, with office at Ely, is in charge.

► Lead-silver concentrate is trucked 90 miles to the rail point at Caliente from the old Groom mine, in western Lincoln County, operated with 50-ton flotation mill on a partnership basis by Dan Sheehan, manager, and the I.M.C. Corp., subsidiary of International Mining Corp., of New York. Mill feed consists of sulphide ore from upper levels of the mine and sorted ore from old dumps. First opened in 1869, early operations produced around 7,000,000 lb. of lead and 120,000 oz. silver. Mail is received at Caliente.

► A report of the Cherry Creek Tungsten Mining Co. shows receipts in 1943 of

\$187,229.80 for concentrate produced by its 50-ton mill at Cherry Creek, northern White Pine County. Willard Cleghorn, secretary and manager, reported \$11,487 net profit.

▶ A dozen or more small producers are mining talc near Palmetto, western Esmeralda County. The crude product is trucked over 50 miles to Big Pine, Calif., whence it goes by rail to plants at Zurich, Keeler, and Los Angeles.

▶ Basic Refractories, Inc., of Cincinnati, is shipping brucite at the rate of 6,600 tons per month to its plant at Maple Grove, Ohio. Contractors excavate some 30,000 tons monthly from the open quarry and the better-grade product is shipped after sorting. The deposit at Gabbs, which now has a postoffice, is said to be the largest and highest in quality known to geologists. The brucite is trucked in bulk to the rail point at Luning, 32 miles. Charles E. Schwab is manager.

▶ Settlement has been received from Metals Reserve Co. by James O. Greenan, Reno, for tin concentrate shipped some time ago to the Longhorn tin smelter, at Texas City, Tex. The shipment included 11,821 lb. of concentrate assaying 63.09 percent tin and 5,181 lb. of middling containing 22.36 percent tin. Payment at 60¢ per pound f.o.b. purchasing agency was for insoluble tin, no payment having been made for a small content of soluble tin. The ore, cassiterite, was mined in the Greenan-Kerr copper-tin mine, at Majuba Hill, Pershing County, and 180 tons treated in a gravity tungsten mill at Toy, near Lovelock, was crushed in rolls and tabled, part of the middling having been returned by hand to the table. Tin content of the ore was 3.24 percent, and the average recovery was 74 percent. Tests by the Bureau of Mines showed a recovery of 88 to 90 percent could readily be made. The tin section of the mine is not being worked, but in mid-March Greenan and Kerr shipped their 225th carload of copper ore, averaging 75 tons per car, to the Garfield, Utah, copper smelter of American Smelting & Refining Co., and shipments are proceeding with ore broken over widths up to 40 ft.

NEW MEXICO

New developments in Black Range district—Continental Chemical & Ore Co. sells lead-zinc mill

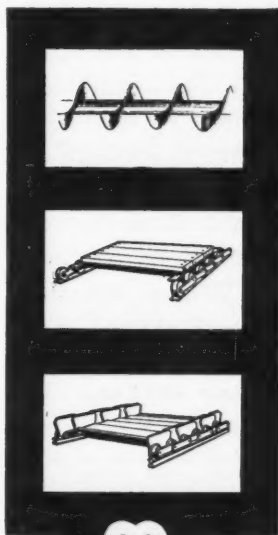
▶ The annual meeting of the New Mexico Miners and Prospectors Association has been scheduled for April 21 and 22 at the Hilton Hotel, in Albuquerque. One of the chief topics for discussion will be the manpower situation, for the State is in need of more men and could easily absorb 1,000 additional miners. Managers of New Mexico's mines are laying plans to cover the loss of men that will result from the Selective Service ruling ending occupational deferments for the 18- to 26-age group.

▶ Black Range Development Co. is con-



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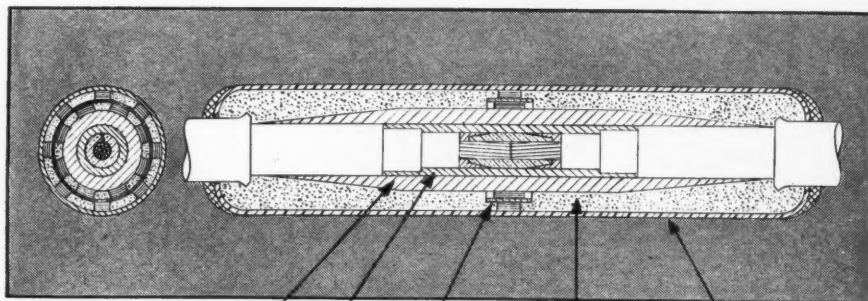
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New Mexico (continued)

tinuing shipments of about 20 tons of good grade lead-zinc ore daily from the development work. Three different portions of its property, the Grand View, Columbia, and the Patsy claims, are included in this development, which is yielding promising results. The Bureau of Mines has completed three diamond-drill holes on the Grand View claim and is now working on the fourth. A. J. Teel, of San Lorenzo, N. M., is the local manager. Carl S. Elayer, of Silver City, is consulting engineer.

► The Royal John mine, in the Black Range district, is showing new activity. Considerable new machinery has been installed to speed development, from which some fine zinc ore is being shipped to the mill at Hanover. The property is owned by Al Owens, of Hurley.

► The ore-processing mill south of Silver City, built by the Non-Metallic Corp. as a fluorspar mill and bought by the Continental Chemical & Ore Co. two years ago and converted to the processing of lead and zinc, was last week acquired by the New Mexico Ore Processing Co. The mill is shut down for alterations and the installation of considerable new equipment to increase the capacity and improve processing. D. W. Schmitt, general manager, is also general manager of the company's Peerless mine, at Central, N. M., which was leased from C. B. Munroe. Mr. Schmitt, who lives on the property, reports that the development of the lead-zinc orebody to date indicates that its full extent has not yet been determined. A mine-run sample or a 180-ton shipment from this body ran considerably in excess of any commercial orebody being at present mined in the Central mining district.

► W. J. Knighton, president of the New Mexico Manganese Co., with headquarters in Silver City, N. M., reports that his company is in production of fluorspar on its lease on the Gila, about 12 miles from International Mineral & Chemical Co.'s fluorspar mill. The company has shipped about 250 tons to date from development. Paul Rhinehard is in charge of the work, which embraces an extensive development program. The company has discontinued its manganese operations.

► St. Louis Smelting & Refining Co., of St. Louis, has leased the iron deposit of Kennecott Copper Co. north of the Santa Rita pit and east of the Carney shaft of Peru Mining Co. The office is about midway between the Carney shaft and the Santa Rita townsite. Development is well under way, and last month's loading, at the Union Hill siding of the Santa Fe, averaged well over 300 tons of iron daily. The operation is in charge of Harry Kline, resident manager, who reports that production is restricted by lack of labor, though more men are coming in and it is hoped soon to begin producing 500 tons a day.

► Banner Mining Co., at Lordsburg, is carrying on development work on the 1,450-ft. level. The ore occurring on the upper levels has also come in on this level. The company is milling approximately 300 tons of crude ore daily from stopes on the

upper levels, and is in addition, recovering about 150 tons from old developments on the property. E. S. Bowman is general manager. This company, in common with all other mining companies in southwestern New Mexico, is experiencing a manpower shortage.

► National Zinc Corp., in the Lordsburg district, is shipping lead-zinc ore to the A. S. & R. mill at Hanover, N. M. This company has also undertaken the production of manganese in the Socorro district, and expects to erect a sink-float mill to treat the ore. Plans are well along for the operation. A. B. Chafetz is the general manager of both the mine at Lordsburg and the operation at Socorro. Morgan G. Huntington is the resident manager at Socorro.

COLORADO

Treasury tunnel completed—New owners for Butterfly Con.—Open larger Resurrection mill

► The Treasury tunnel (See *E.&M.J.*, October, 1943, page 78) was completed late in February to the point from which a raise will be driven up to the old workings of the Black Bear mine, the zinc, lead, and copper ore of which will then be removed through the tunnel. The Black Bear, on the western slope of the La Plata Mountains at an elevation of 12,400 ft., was inaccessible during much of the year, and Stiers Brothers Construction Co. was commissioned to extend the Treasury tunnel, whose portal was on the eastern slope of the mountain at 10,625 ft., to tap the Black Bear workings from underneath. Tunneling and mining operations are being conducted by Sunshine Mining Co., of Idaho, as agents for Metals Reserve Co., and ore from the Black Bear will be treated in the mill of Idarado Mining Co. at the tunnel portal. Despite the freezing coldness of the water encountered in the tunnel, crews directed by John R. ("Long John") Austin drove 6,340 ft. of 9x9-ft. tunnel in about seven months from the time work started on July 13, 1943. Daily average advance was about 50 ft. Work has begun on the 950-ft. raise required to reach the Black Bear. John Edgar is manager at the property for Sunshine Mining Co.

► The Franz property, at Greenville, on Elk River about 20 miles northwest of Steamboat Springs, was discovered in the early days of the Hahns Peak excitement, and desultory surface development has gone on there ever since. For years, the Franz family has maintained assessment work, including the driving of several tunnels. The Smuggler, one of ten claims, is now yielding zinc ore from a vein 4½ ft. wide. Operations are carried on under a government loan, and about a carload of ore is produced per week to be hauled to Steamboat Springs for shipment via the D.&S.L. to Salt Lake City.

► The Public Service Company of Colorado has connected the Silver Spruce mill,



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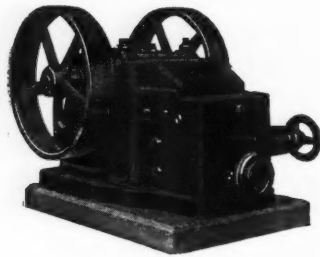
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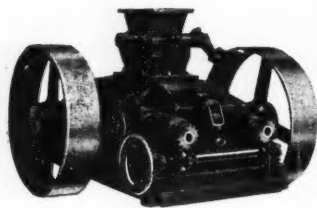
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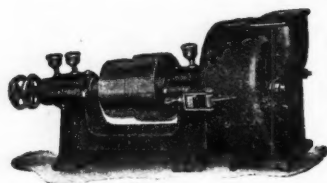
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Colorado (continued)

at Idaho Springs, with the power line, which replaces the old diesel power. This mill has been doing some custom work, and is now getting ready for increased activity this spring.

► The Butterfly Consolidated mill at Ophir, which was destroyed by fire in December, 1940, is being rehabilitated, following its purchase by Frank Appel, of Milwaukee, Wis., at a tax sale. Max and Walter Binner have been in charge of the new operation; and Erwin M. Graff is secretary of the Butterfly Consolidated Mining Co. Lead, gold, silver, and copper are found in the ore, and some tungsten is known to exist in the Silver Bell part of the group.

► United Gold Mines Co., in the Cripple Creek district, has five sets of leasers producing a fair grade of ore from the Vindicator mine, and a moderate amount of development work is being done. J. S. Anderson, superintendent, has been operating this property for many years, and he believes there is a better outlook for it now than a year ago. This company also operates the Teller County Air Co., which furnishes compressed air to the Favorite, Patti Rosa, and Logan mines.

► J. E. Meyers, manager of the Colorado Feldspar Co., at Canon City, has developed two large deposits in Gunnison County. About 20 miles east of Gunnison, near Ohio City, the company now has sufficient feldspar in sight to ship about 50 tons daily. The company is a subsidiary of the Consolidated Feldspar Corp., a New Jersey concern that owns feldspar properties and grinding plants in various districts of the Eastern United States.

► J. E. Dresbach has opened several levels of the Valley Forge mine, on Tower Mountain near Silverton. Machinery has been installed at the lowest opening not far from the mill and highway; and Dresbach expects to have this property in operation by spring.

► Resurrection Mining Co., at Leadville, has opened its enlarged (800-ton) mill, which formerly treated 350 tons daily. This is the largest operating company in the Leadville district.

► Since the gold restriction order closed most of the Cresson mine, at Cripple Creek, the large machine shops have been busily engaged in turning war materials. These are airplane fittings and forgings for Navy valves, made under the supervision of Guy Rorabaugh, master mechanic. The machine shops have also made and maintained equipment for the Monte Cristo zinc-lead mine, and engaged in general machine-shop work for other active mines. The Cresson shaft is being retimbered and general repairs are under way in the mine, that the property may be ready when gold mining is again permitted.

► The 12 claims of Highland Mines, Inc., which adjoin the Midnight property, on Richmond Hill, 6 miles from Aspen, will be operated under L. E. Russell, head of Midnight Mining Co., with offices in San Diego, Calif. The Highland tunnel will be continued to make available additional ore

and also for the further reason that it can be used as a haulage, drainage, and main working tunnel. E. S. Gould, of Aspen, is president of Highland Mines, Inc., and Fred T. Willoughby is general manager of the Midnight mine.

► Royalty agreements covering much of the land that will be affected by the Leadville drainage tunnel have been filed in the office of John Gregory, county clerk, and are being recorded. The documents were sent in for recording by the attorney for the Western Region, Bureau of Mines, Salt Lake City, Utah.

► M. H. Salsbury, superintendent of the Portland mine, at Victor, reports that the 1943 production was necessarily small, with 40 percent of it furnished by lessees and the remainder by company operations. Seven sets of lessees are working the mine, and several other groups are busy on surface operations. Company work consists of mining caved stopes, and a small amount of development.

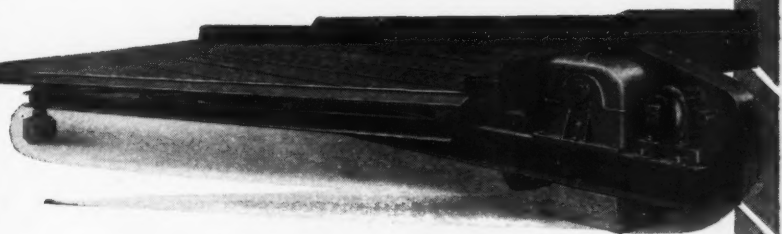
► The shaft of the Franklin mine, in the Gilson Gulch area, Idaho Springs, is being cleaned out by Phil Portenier, Arthur Portenier, and David Kingery. It will require about a month to retimber the shaft and clean out the shaft and drifts. During this time they will put up shop buildings and prepare the hoist house and compressor plant for production this spring. The Franklin mine is an old-time producer of silver-lead-zinc ore, but it has not been worked successfully for a number of years.

► C. T. Van Winkle, general manager in charge of the Rico Argentine Mining Co. in Dolores County, has overcome many handicaps in maintaining operation. These included the fire last July that destroyed improvements which had recently been installed. New orebodies have been encountered, and the company has abandoned the use of the St. Louis Smelting & Refining Co.'s shaft, and is now using its own. The crosscut tunnel that was driven to the Atlantic Cable shaft from the Van Winkle was completed and a good grade of ore has been opened up. About 3,000 ft. of diamond drilling was finished; 6,000 ft. of drifts, raises, and crosscuts were made, and the company's 135-ton mill was kept in continuous operation, producing lead-silver concentrates that were shipped to Leadville, and zinc concentrates which were shipped to Amarillo.

► W. Dustin, resident superintendent of the Golden Stars Mining Co., Cripple Creek, is operating through the Morning Glory shaft, and is drifting on the Doctor Jack Pot vein, leased from the Doctor Jack Pot Mining Co. W. C. Benton is president of the company.

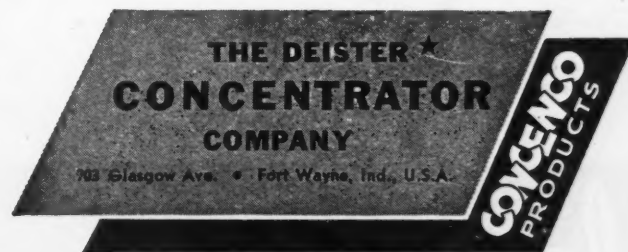
► The Fortune mine shaft, near Leadville, has been sunk 100 ft. to a new body of ore, and a contract has been let to sink an additional 100 ft. Under Paul T. Clark, manager, the mine has produced 100 tons of lead and 110 tons of zinc during the past year, in spite of the fire that destroyed most of the shaft timbering. Arrangements are being made to hoist the ore only to the Yak tunnel level, whence it will be trammed to the Resurrection new 800-ton mill.

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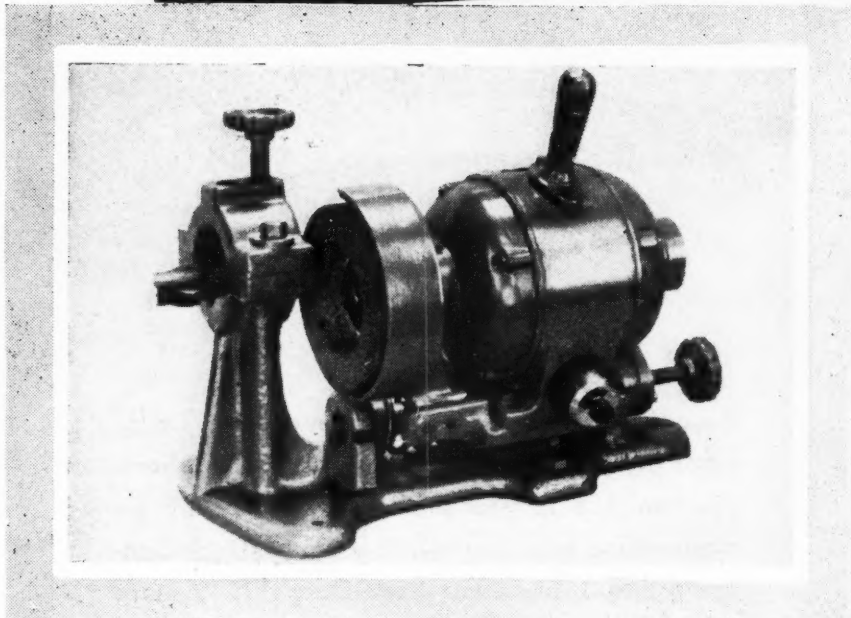
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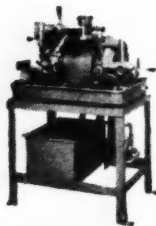
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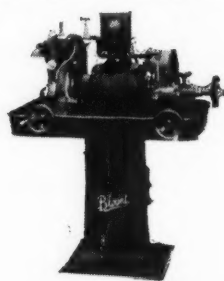
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MONTANA

Victoria Mines, Inc., now operating lead-zinc mines—Manganese mine explored near Butte

► Victoria Mines, Inc., is now operating the Toledo and Buckeye mines, near Sheridan, in Madison County. The Buckeye mine is being unwatered and explored, and workings in the Toledo mine are being driven to develop lead-zinc ore found by diamond drilling done by a U. S. Bureau of Mines field crew working out of the Bureau's Helena office. Victoria Mines, Inc., operated the Broadway mine near Silver Star, in Madison County, for several years, but the Broadway, being a gold-silver mine, is closed for the duration. Sherman B. Hinckley is manager of the company's operations.

► Amy X Mining & Trucking Co. is exploring for manganese carbonate ore on the 400-ft. level of the Britannia mine, south of Butte, in Silver Bow County. Most of the prospecting is done by diamond drilling, but the mine is also equipped with an electrically driven hoist, an air compressor, and a pump. No mining of ore is being done at present. Peter Antonioli, of Butte, heads the company.

► John and Milo Garbarini are producing manganese ore from a new development in the Eagle Bird vein, west of Butte. The mine workings are in the oxidized zone in the vein and consist of an adit crosscut and tributary drifts. The manganese dioxide ore has been shipped to the Metals Reserve stockpile.

► The Helena office of the U.S.B.M. states that systematic sampling by trenching and core drilling indicates that the Running Wolf iron deposits, near Stanford, in Judith Basin County, do not contain enough ore in this one area alone to form the basis of an iron and steel industry. The iron ore is high-grade mixture of magnetite and hematite, but there are local occurrences of iron pyrite. The Bureau now plans to explore other reported iron-ore deposits in the State in the hope that some of them can be combined with the Running Wolf deposits to make their exploitation practicable. The Bureau is also investigating the coking qualities of Montana coal.

UTAH

Army-Navy "E" for Garfield—The Geneva Steel plant opens—Merger of two Bingham mines discussed

► Utah Copper Co. in its annual report to the Utah State Tax Commission gave its net proceeds for 1943 operations as \$47,768,326, which compares with \$44,148,257 for the preceding year. Net proceeds under the Utah tax law are used in

computing the valuation for tax purposes and do not permit the deduction of federal taxes or depletion allowances.

► Utah Copper Co. officials have received a letter from Major General David McCoach, Jr., commanding general of the Ninth Service Command, Army Services Forces, Fort Douglas, Utah, congratulating the company on its safety record. For the three-month period of July to September, 1943, the 2,307 employees worked a total of 564,632 hours without loss of time arising from accidental injury.

► For its production record, the Garfield plant of the American Smelting & Refining Co. was awarded a Silver Star to add to its Army-Navy "E." Notification was received by Kuno Doerr, Jr., assistant general manager, Utah department, from Robert P. Patterson, Undersecretary of War.

► Governor Herbert B. Maw has appealed in a letter to President Roosevelt for favorable action on the request of the International Union of Mine, Mill and Smelter Workers (CIO) sent to the National Labor Relations Board for an increase in wages. The CIO union appealed in January to the NLRB after the Nonferrous Metals Commission awarded mine and smelter workers a 25c. per day increase. Governor Maw pointed out in his letter to the President that Utah miners, mill, and smelter employees have made "an enviable record . . . They have stayed on the job continuously and worked long hours under trying circumstances. . . . They have done this notwithstanding the fact that men performing similar work in other Western states were receiving from \$1 to \$1.30 per day higher wages than they received."

► D. D. Moffat, president and general manager of Utah Copper Co., branded as "absurd" charges filed by the Utah Metal Trades Council (AFL), accusing the company of unfair labor practices in a recent election to select a bargaining agency. A. H. Peterson, general representative, AFL, charged that in the recent election officials of the Independent Union of Mill Workers, a union ordered disbanded by both the courts and the NLRB, were appointed by the company to act as judges. Copper company officials also issued, said Mr. Peterson, a letter to employees just before election. "One of America's most prized heritages of freedom is the ballot box," replied Mr. Moffat. "I did write a letter to Magna and Arthur mill employees. . . . I wrote each individually urging him to go to the polls and vote his conviction. I also earnestly urged every employee to cast a ballot."

► Output of the New Park Mining Co., Park City's leading zinc producer, increased net revenues in 1943 to \$1,232,000 and net income to \$682,900, before federal taxes and depletion charges, compared with \$1,075,564 and \$376,756 for 1942. W. H. H. Cranmer, president and general manager, reports.

► Merger of the Utah Metal & Tunnel and the National Tunnel & Mines Co., operating adjoining mines at Bingham, was considered at special stockholders' meetings held March 20 in Portland, Me.

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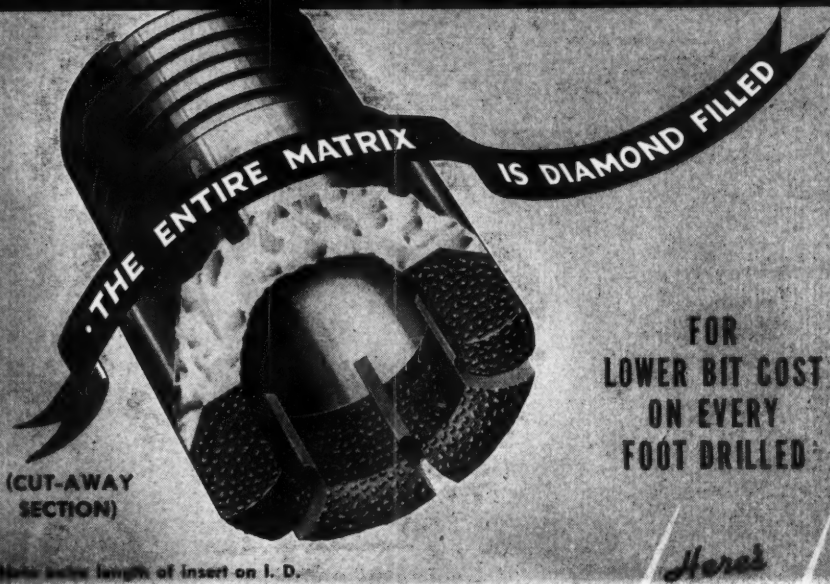
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Utah (continued)

The proposed merger would place the combined company under the control of International Smelting & Refining Co., which owns majority stock in the tunnel company. It would also facilitate the development of important limestone ore horizons in the Phoenix section, and eliminate litigation over apex rights.

► Manpower shortage is reflected in the annual report of the Silver King Coalition Mines Co., operating at Park City. Output was larger, but total costs were greater, reducing the net profit to \$217,985 for 1943, compared with \$245,795 in 1942. Other figures are: Income from ore sales, \$1,911,850 in 1943 and \$1,761,719, 1942; total costs, \$1,666,755 and \$1,478,095.

► Improved values of ore mined below the water level increased the Chief Consolidated Mining Co.'s net operating profit in 1943 from net sales of ore of \$667,068 (including quota premiums) to \$142,177 before depreciation of \$28,933.

► Tintic Standard Mining Co. reports mining 58,705 tons of ore in 1942, a decrease of 20,000 tons compared with the 1942 production, resulting chiefly from the manpower shortage. Total net income amounted to \$331,811 after spending \$165,551 on development and the building of a mill for treating fluor-spar at the Cougar mine, in Beaver County.

► Ohio Copper Co. reports a net profit for 1943 of \$79,427 before depletion, compared with \$26,916 for 1942. The company reports investing \$142,605 in the development of the Big Indian property, including the construction of a mill. Operating profit from the treatment of tailings at the Lark (Bingham district) plant was \$165,870, compared with \$75,416 in 1942.

► Less than two years after ground was broken on the plant site, the plate mill of the \$180,000,000 Geneva Steel Co. plant, near Provo, went into operation on March 23. This plant, the largest integrated steel plant west of the Mississippi, is operated by Geneva Steel, a subsidiary of U. S. Steel, under contract with DPC. Annual ingot capacity will be 1,280,000 tons.

IDAHO

Chester vein rights settled amicably—A.S.&R. to develop High-land-Aurora mine

► Sunshine Mining Co. has declared its first quarterly dividend for 1944 at the rate of 10¢ a share, totaling \$148,882, payable March 31 to stockholders of record March 1. This payment brings the company's total dividend record to \$23,343,812. In the company's annual report, just issued for the year 1943, R. M. Hardy, president, refers to the development of the Chester vein, which is now considered by mining men of the district to be the largest and

richest body of lead-silver ore that has been found in the United States in the past 30 years. R. D. Leisk, manager of Sunshine, modestly calls it "the most important development of the year." It is on the 2,700-ft. level of the Sunshine mine in what is known as the Chester vein and fault zone, and has no connection with the productive areas of the original Sunshine vein system. The discovery was made in the course of exploration undertaken at the request of Polaris Mining Co., and subsequent work has disclosed excellent ore at various points for 600 ft. on the strike and 750 ft. on the dip, with the full extent of the ore zone in both strike and dip still to be determined. Compromise agreements have been entered into and a dividing plane has been established creating two workable areas on the Chester vein. In the "Rambo" area, west of the dividing plane, the equities in the ore are Sunshine 60 percent and Silver Syndicate, Inc., 40 percent. In the "Omega" area, east of the dividing plane, Sunshine and Polaris have equal rights. Also east of the line lies the Rotbart claim, 600 ft. in length and owned by Lincoln Mining Co., but held under a 99-year lease by Silver Dollar Mining Co. Negotiations have been completed whereby Sunshine, Polaris, and Silver Dollar each acquires a one-third interest in the net profits production of ore from 400 ft. of the Rotbart claim, starting at the "Omega" dividing plane, and Lincoln Mining Co. collects 12½ percent royalty from the Silver Dollar's one-third interest. This is one of the simplest settlements covering extralateral rights in mining history, and it has been accomplished without recourse to the courts.

► Fourteen mining companies of the Coeur d'Alene district and representatives of the different miners' unions of the district have been holding hearings for several weeks before Verner E. Wardlaw, federal commissioner of conciliation, Department of Labor, to determine wage scales for the district.

► Casino Mining Co., which recently purchased the old Homestake mine, near Ketchum, Idaho, reports shipping its first car of zinc-lead ore to Salt Lake smelters. Company officials report they can now ship a carload every day from ore reserves in sight, although operations were unprofitable under marketing conditions existing when the mine was first opened up.

► Clayton Silver Mines, operating a property at Clayton, Idaho, has developed a remarkably large body of silver-lead-zinc ore within the past few months. The orebody on the 300 level is 40 ft. wide, of high-grade milling ore as demonstrated by stopping operations covering a period of six months. Concentrate is hauled in company-owned trucks 60 miles to the nearest railhead at Mackey, Idaho. The company has paid in the past two years \$195,000 in dividends. Clayton mine adjoins Henry Ford's Red Bird property, which the Ford company purchased several years ago, but from which no production has yet been made.

► Lucky Friday Mining Co. has now opened 100 ft. in length on a rich body of silver-lead-zinc ore on the 800 shaft level. Drifting 50 ft. east and west from the shaft

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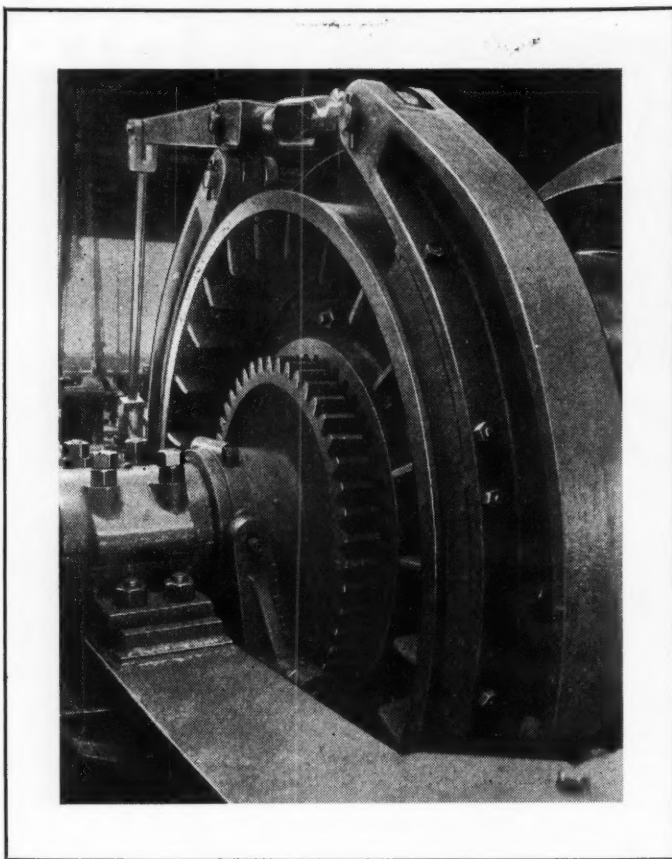
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Idaho (continued)

opening has proved the orebody is longer and wider than on levels above. In 100 ft. of drifting, the company has taken out about 1,000 tons of high-grade ore that will be sent to the Golconda mill for treatment. The Lucky Friday is just a prospect development by a local stock company, but it has been a lucky prospecting venture. Up to date the company has received net smelter and premium returns totaling \$152,405.74, which has paid the purchase price of the property and all development and machinery installation expenses.

► American Smelting & Refining Co. has taken over the prospect development and operation of the Highland-Aurora lead-silver mining property in the Beaver Creek district north of Wallace. The deal provides that A.S.&R. is to be reimbursed its development costs out of royalties from the sale of ore on a basis of 90 percent of the net proceeds until the investment is returned, after which the operation will be on a 60 percent basis to the smelting company and 40 percent to the Highland-Aurora company. A.S.&R. had an option on the same property in 1942 but gave it up because of the manpower shortage. Butte-Highlands Mining Co., of Butte, Mont., then became interested and purchased a large block of Aurora company stock, reorganized the company, and changed the name to the Highland-Aurora. This company started to sink a shaft to a depth of 500 ft. and had completed the work to a depth of 370 ft. when the present deal was made. A.S.&R. plans to continue this shaft to a depth of 1,000 ft. before prospecting of the vein is attempted. The work will be in charge of Federal Mining & Smelting Co., A.S.&R. subsidiary, with H. G. Washburn as resident manager.

► Federal Mining & Smelting Co.'s recently discovered extension of the Tony vein on the 2,400-ft. level of the Page mine, west of Kellogg, has been developed for a length of 350 ft., showing an average width of 6 ft. of ore that gives average mill feed values of 15 percent lead, 10 percent zinc, and 15 oz. in silver per ton. This discovery is the deepest in that section of the district and is east of the productive territory in which the mine has operated for the past 16 years.

WASHINGTON

Alder Group Co. to be sold on court order—Kaaba-Texas to increase mill capacity

► The property of Alder Group Mining & Smelting Co., 4 miles from Twisp, will be sold under court orders, bids to be received up to June 1, by the Seattle First National Bank, liquidator. This has been a substantial gold producer during several years while litigation was pending. The claims involved are the Alder, Twisp, Methow and others. A mill near Twisp is also included in the ownership. The holdings date back many years and have been operated at dif-

ferent times by several companies or owners, including Mahlon McCain and Charles W. Gillespie, of Spokane. The siliceous gold ore near the surface changed to copper bearing ore at depth. The property is said to have produced more than \$300,000.

►The Washington State Department of Conservation and Development has published a report in which it is said enough iron ore to run an electric furnace 33 years has been revealed near Cle Elum, in the central part of the State. Sheldon L. Glover, State Supervisor of Mines and Mining, has made public this report because of the wide interest in a possible iron and steel industry in the Pacific Northwest. Carl Zapffe, when he was geologist for the Northern Pacific Railroad Co. years ago, made a study of these iron-ore occurrences and supplemented them in March, 1943, with an additional report after surveys, measurements, and an analysis had been made. He is now manager of iron-ore investigations for that railway company. The deposits, he states, are mainly in five claims owned by Balfour, Guthrie & Co. J. T. Mullen and C. L. Holmberg, mining engineers, assisted Mr. Zapffe in making his examination. The possible quantity of ore is estimated at more than 2,500,000 tons.

►The 40-unit federal housing project for mine operators has been completed at Northport, according to W. G. Priest, housing manager. Rental rates run from \$22 for a no-bedroom unit, unfurnished, to \$37 for a three-bedroom furnished unit.

►P. E. Oscarson, in charge of the Spokane office of the U. S. Bureau of Mines, reports that diamond drilling has been done by the Bureau to determine the size of zinc deposits at the Sierra Zinc Co.'s mine, near Aladdin, in Stevens County.

►Lee B. Carroll, of Seattle, manager of Kaaba-Texas Mining Co., will soon increase the capacity of its mill, near Oroville, from 110 to 150 tons daily. Two cars of lead concentrate and one car of zinc were shipped in February. The mine's manpower allotment has been increased from 20 to 24 men.

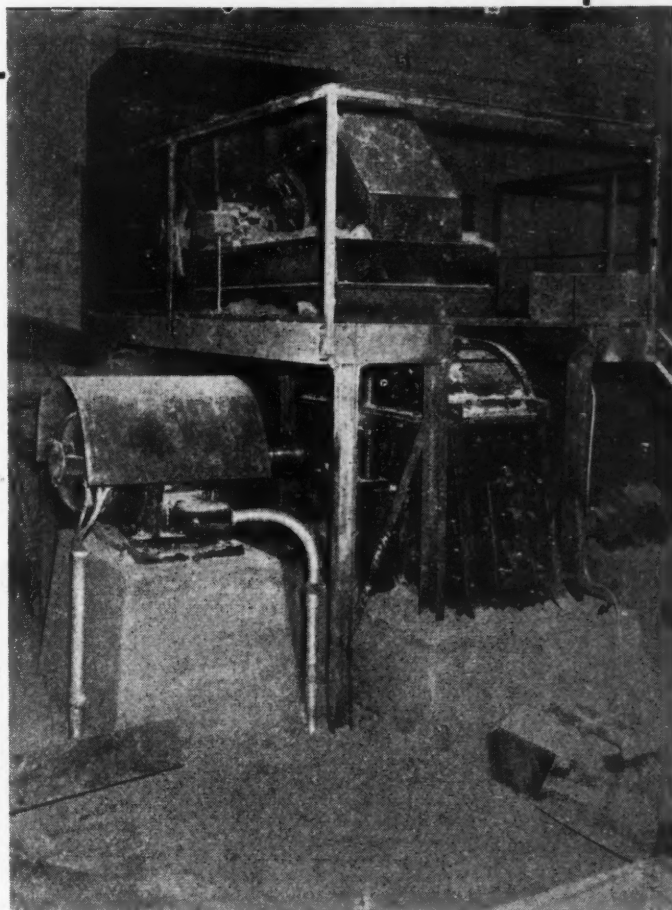
►Howe Sound Co. has declared its regular quarterly dividend of 75¢ a share. The date of payment was fixed for March 31. The disbursement was \$371,693. This company, with property in the Cascades, is the heaviest gold and copper producer in the State.

►The management of the ALCOA aluminum plant at Mead, near Spokane, and Local 29 of the Aluminum Workers of America (CIO), have jointly petitioned the local wage and hour office of the Department of Labor for approval of a proposed wage increase for many of the company's employees. W. N. Farquhar, works manager, and R. A. Zornes, president of the local, signed the petition. This plant, the largest aluminum reduction works west of the Mississippi, has been in operation since May, 1942.

►Operations will be expanded to a third level early this year at the Crescent mine on the Olympic Peninsula, 30 miles from Port Angeles. The mine, a manganese producer, is operated by Sunshine Mining Co.

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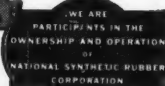


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TRI-STATE

New open-pit mine near Central City—Rich zinc-lead strike in Pearl mine—Barr mill sold

▶ Although Tri-State blende production is expected to average around 7,800 tons weekly for the first quarter of 1944, this average cannot be maintained under the stepped up tempo of selective service inductions. Some of the major companies already are considering closing some of their properties and shifting men to keep other mines working.

▶ Preparations for an extensive open-pit operation by West 66 Mining Co. are well under way on the Landreth land, a half-mile west of Central City and just south of U. S. Highway 66, west of Joplin. A large drainage ditch has been cut to divert a small branch from the mineralized area and two small cofferdams were thrown up to prevent flooding of the proposed strip pit. The company plans to mine a two-acre area churn-drilled late in the twenties by the old Goldenrod Mining & Smelting Co., which disclosed a good deposit of blende, zinc silicate, and lead. The ore deposit ranges from a depth of 15 to 75 ft., with a 40-ft. face of silicate in places, according to D. Simpson, of Joplin, who is interested in the operating company and will be in charge of operations. Associated with Simpson is N. B. Rogers, of Joplin. They formerly were engaged in highway and paving construction work at Topeka and Kansas City.

▶ Pearl Mining Co. has opened a rich zinc-lead mine on a 40-acre tract in the Thoms Station area, 4 miles northwest of Joplin, which was leased from St. Louis Mining & Milling Co., according to B. D. Bensing, who is interested in the former company and is manager of the latter. They completed a new shaft on the tract, a half mile southeast of the old Grasselli No. 2 mill, which is operated as a custom mill by the St. Louis company, last November to a depth of 135 ft. A drift was cut out on that level toward the west, picking up the ore deposit about 30 ft. out from the bottom of the shaft. Two millings of ore were taken out in driving the drift about 20 ft. further, where the richest ore was encountered. Out of the third mill, of 450 tons of ore taken from the shaft about 25 tons of zinc concentrates, a similar amount of lead concentrates, and about 26½ tons of chunk lead have been recovered. Some of the chunks of lead found underground weigh around two or three tons each, and five headings in the drift show a zinc ore content of about 5 percent, Bensing said. The mine site was drilled out by Grasselli Chemical Co. during the latter part of 1925. Associated in the operating company with Bensing are Congressman Thomas D. Winter, of Girard, Kan.; W. M. Frogue and Fred Simkin, of Columbus; and Elmer W. Columbia and H. J. Cloonan, of Parsons.

▶ Lawrence-McNulty Mining Co. has opened the old M.&H. No. 2 mill shaft

just west of Baxter Springs and north of U. S. Highway 166. Mine operations are being carried on out from the shaft, which is 231 ft. deep around the 250-ft. level. Ore is being treated over the Mutual Mining & Development Co.'s mill at Hockerville. A derrick and 150-ton hopper were moved to the mine site from the Oldham operations on the old H.H.&H. mine lease of the Morrison land, a mile northwest of Baxter Springs. Associated in the company are M. J. McNulty and J. F. Lawrence, of Tulsa.

► Cardin Mining & Milling Corp. has purchased the Western and Captain tailing re-treatment plants and other holdings of the Westcap Mining Co., a partnership. No changes were announced in the management of the company or the corporation. S. L. Kennev, of Miami, continues in charge of the Nos. 2 and 3 tailing plants of the Cardin Corp.; Henry Hartzell, of Baxter Springs, in charge of the Western property; and William Ellison, of Treece, continues to supervise the operation of the Captain tailing mill, near Treece. The three other plants are situated near Cardin. The merger became effective as of the first of March.

► United Zinc Smelting Co. has acquired the old Vinegar-Hill Zinc Co.'s Barr mill from Eagle-Picher Mining & Smelting Co., which last operated it about a year ago as the Westside mill. United Zinc plans to dismantle the mill and move it to its Park-Walton lease, where it will be reconstructed into a new concentration plant. In cooperation with the U. S. Bureau of Mines, and through the aid of Defense Plant Corp., the company has developed a good prospective orebody on the virgin lease, which is southwest of Melrose, Kan., in Oklahoma, about 7 miles west of Picher. D. G. Harrison, of Joplin, is district manager of the company.

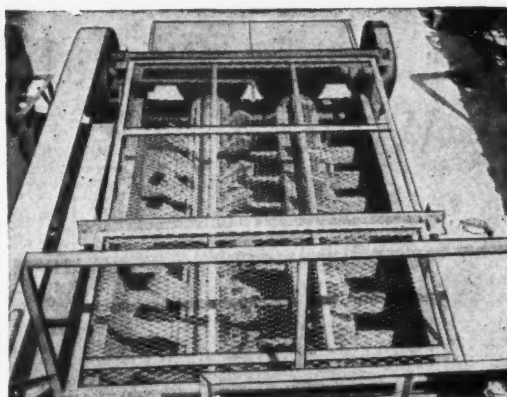
► C. & M. Mining Co. has taken over the operation of the No. 4 mine of the St. Louis Smelting & Refining Co., a mile and one-half southeast of Hockerville. The St. Louis company will continue the operation of its tailing plant in conjunction with the property. Associated in the company are Earl Childress, Kenneth Childress, and Herbert Milligan, all of Baxter Springs.

► Wentworth Mining & Milling Co. has resumed mining and milling operations at its property southeast of Wentworth, following several months' shutdown. During the shutdown, the mill shaft, which had been in bad condition, was recribbed and repaired. C. F. Denney, of Joplin, is manager of the company.

ARKANSAS

Hendricks concentrator begins production—New zinc mill is planned at Hurricane mine

► Notwithstanding hampering rains and snows during February and early March, the Batesville-Cushman field made a good



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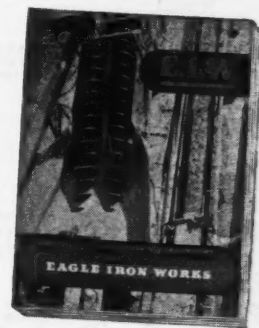
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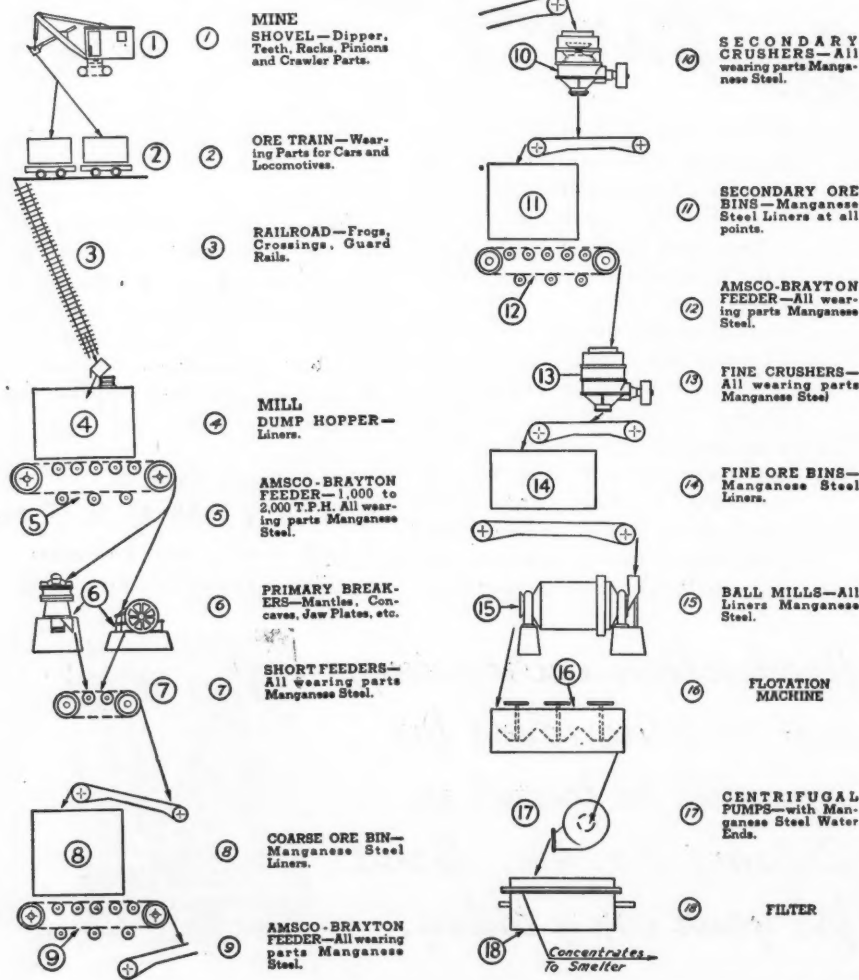
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The simplified flow sheet below, while based on an average copper mining and milling operation, is typical of ore production, crushing, grinding and metal concentration in general. The equipments to which manganese steel is most commonly applied are shown.

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Arkansas (continued)

production in February. Total production ran to approximately 1,410 tons, of which about half was low grade and medium, and the rest high grade. The demand for low grade by Alabama pig iron furnaces is still heavy, and shipments of this grade of ore in March will show an increase. Operators are taking ore now that runs from 25 percent up.

▶ Walter H. Denison Manganese Co., of Cushman, Ark., made the largest production in the field in February with a total of 400 tons, 320 tons of which was low grade. Most of the production came from the Bill Jim, Wild Cat, and Ozark properties.

▶ Hendricks Mining & Milling Co. produced 305 tons, including 155 tons of high grade, in February. The company is operating the Southern Hill, Polk Southard, and Turner properties near Cushman, Ark. Its main office is in Batesville, Ark., and Alvin Hendricks is general manager. The high grade produced was all washed and concentrated in the company's new plant, and averaged 48 percent Mn. Its plant should be producing approximately 400 tons of high grade a month before long. The crude ore that is run through the plant is residual clay from the Fernvale lime, that carries a disseminated, high-grade manganese oxide in small particles. Strip mining operations are conducted with a 2-yd. power shovel and a bulldozer. Thirteen trucks move the ore to the plant, which handles about 100 tons an hour. The flowsheet starts with a big vat, in which the crude ore is puddled. From the puddling vat the ore goes through two sets of large log washers and then into a scalping screen that separates lump ore from the fines. The lump ore goes onto a picking belt, and the finer ore goes from the scalping screen into a sizing screen, which sizes it from $\frac{3}{8}$ to $\frac{1}{4}$ in. From the sizing screen it goes into the jig cells, which remove all foreign matter. The plant has three jig-cell batteries, two of which carry four cells each, the other battery carrying five cells. Finest ore is concentrated on three concentrating tables. The plant is operated by electricity. One generator is driven by a 100-hp. diesel and the other by a 120-hp. diesel.

▶ Par Mar Engineering Co. and the E. & A. Mining Co. have consolidated. James Wood is operating engineer, and Max Cohen, work manager. Their main office is in Batesville. They have their new beneficiating plant, on the Bayou, in Batesville, in operation and during February produced approximately 200 tons of high grade in the plant. Within the next few weeks they will add filters, 12 tables, and a rotary sintering plant to their equipment. They will also start hydraulic operations on their Lafferty Creek property about March 15, and get it into production again. Their trouble with operations on this property was lack of proper power, both for their mill and hydraulic nozzles.

▶ C. S. Little, of Batesville, who operates the Grey Hill property, lost two

shafts in February because of heavy rains, which caused them to cave in. He will start drilling operations on the property soon to prove up a blanket run of ore that lies from 18 to 22 ft. deep. If satisfactory results are obtained from the drilling, he will start strip mining on the property.

► Charles Sims, operating the Waters and Einstein properties near Cushman, produced 75 tons in February, of which 25 tons were high grade. He has also recently taken over the Tate property, near Cushman, on which he has sunk two shafts, both of which are producing.

► Production in the north Arkansas zinc and lead field in February and early March was very low, only one car being shipped. Three new milling plants that will be completed in the field within the next few months promise a better production. These plants are all financed by private capital.

► The S. & G. Zinc Co., Inc., J. C. Shepherd, of Harrison, in charge of operations, is now operating the Hurricane mine, near Pindall, in Searcy County. Test shafts and prospect drilling operations show a big tonnage of crude for milling purposes. The ore is both jack and carbonate. The company will start construction of a 200-ton concentrating plant within the next few days. Equipment is already being hauled to the property. The Hurricane mine was one of the largest producers in the field during the First World War. Mining during that period was carried on in a pit about 40 ft. deep and 100 ft. wide. This pit will be cleaned out and operations carried on as before. Besides air drills, mining equipment will include one bulldozer and dragline.

► Advance Mining & Engineering Corp., John L. Stone, of Harrison, Ark., in charge of operations, is operating on the North Star property 3½ miles east of Harrison on Crooked Creek. One big tunnel cuts into the ore run from the bank of the creek. This tunnel has been cleaned out and put in good condition for mining purposes. One shaft has been sunk 90 ft. deep into the ore run back of the creek bank. The company has a new air-type concentrating plant under construction, which will be completed about May 15. It consists of air concentrating tables and other equipment.

► Hall Mountain Mining Co., J. C. Jones, of Yellville, in charge of operations, has started work on the old Wickersham tunnel on its property. Operations are back about 35 ft. and are in a good run of zinc carbonate that runs from 10 to 12 percent zinc. This is the second operation the present owners have started on the property. Former work was done on the Truex tunnel, in which a good run of high-grade carbonate of zinc mill ore, which runs about 20 percent, was started. The company has several hundred tons of this ore on the dumps. It expects to start construction of a mill on the property within the next 30 to 60 days.

► The Bureau of Mines is sinking its fifth test hole on the Coon Hollow property,

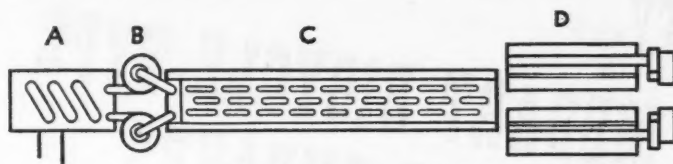
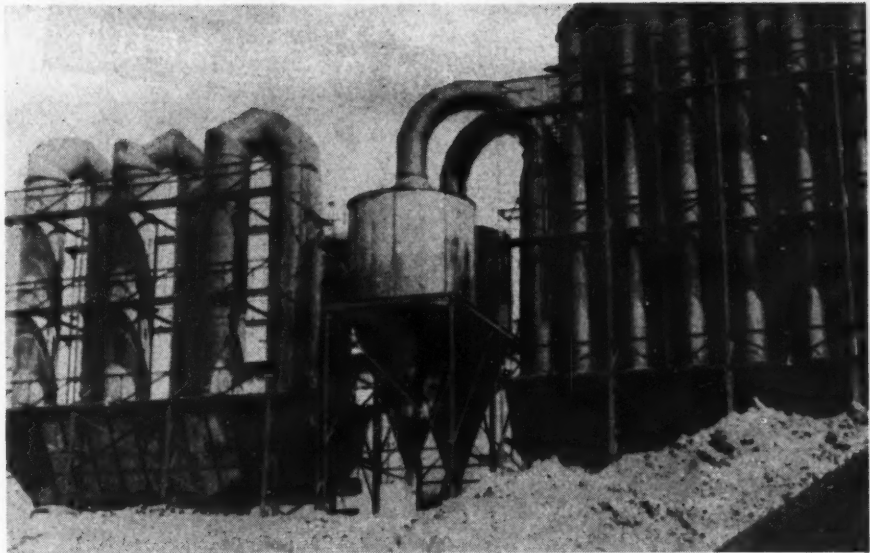


Diagram shows course of fume through first stage cooling (A), centrifugal separators (B), second stage cooling (C) and bag houses (D). Fume is 900° at start and 200° at Norblo Bag Type Collectors.

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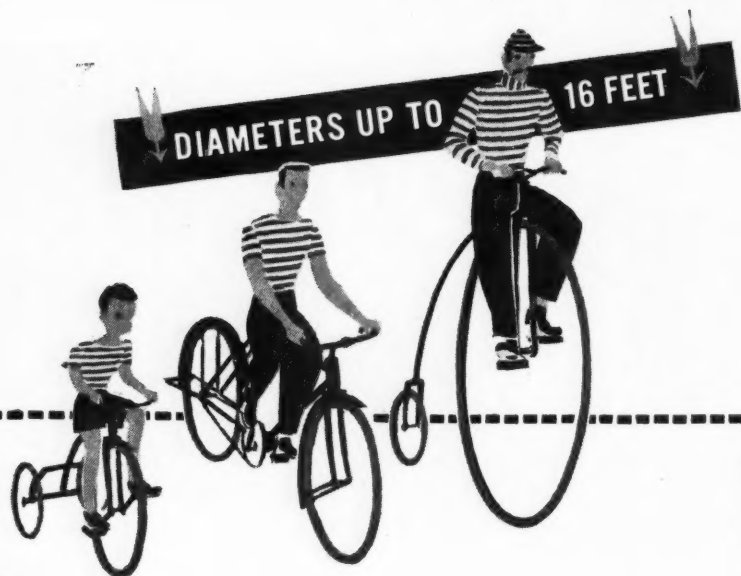
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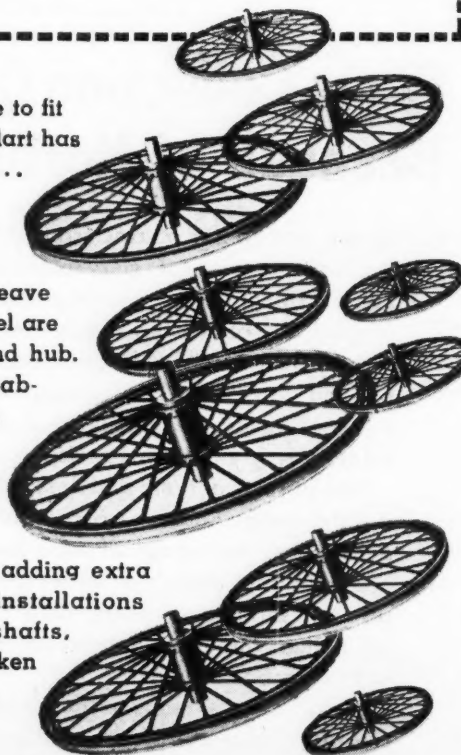
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Arkansas (continued)

near Zinc, Ark., in Boone County. The Bureau has encountered showings of ore in each of the four holes completed. One hole was drilled 270 ft. deep into the Powell formation. In this hole a showing of jack at 250 ft. was discovered. R. B. McElwaine, with headquarters at Harrison, Ark., has charge of drilling operations for the Bureau. Claud Huddleston, of Yellville, Ark., is doing the assaying.

► Roy Morrow, of Oklahoma City, Okla., has taken over the Mattie May property, in the Rush Creek district, and has started mining operations. He is moving in more mining equipment this week. This mine was opened up during the last half of the first World War, and carries a good run of jack.

MICHIGAN

Isle Royale's copper cost 21.7c. per pound in 1943—Extend Copper Range MRC contracts to June

► Isle Royale Copper Co.'s production of 6,279,771 lb. of copper in 1943 cost an average of 21.669¢ per pound, or 23.255¢ after charges. But, with the aid of a government subsidy, the company made a net profit of \$35,449.11. Net income before charges, such as depreciation, depletion, and amortization of dewatering and rehabilitation, was \$134,196.08. Labor cost per pound is so high that it would be impossible to operate without government assistance. The company's contract with Metals Reserve Co., which buys the copper concentrates at a special price, has been temporarily renewed, for a period of three months, March, April, and May. The extension has been granted with a slight reduction in price. Copper yield per ton of rock stamped in 1943 was 20.359 lb. Improvements in milling practice and plant equipment additions resulted in a low tailing loss and a higher grade of concentrate. Pointing to dwindling ore reserves in the copper industry in the United States, the company stresses the need of a sound conservation policy. Such a policy, it says, should not countenance the abandonment of mines in the Michigan district, where a large tonnage of copper ore is in sight and much more awaits development. The copper can be recovered, it emphasizes, only if the mines continue operating, but it may be lost forever if the mines close down.

► Preliminary stoping has been started in Centennial No. 2 shaft of the Calumet & Hecla Consolidated Copper Co., and full production is expected to begin in the near future. Centennial, closed since 1931, has been undergoing repairs for some time, and has been dewatered to the 41st level. The shaft extends to the 43d. New equipment includes two modern compressors, electrically driven, which are housed in an annex to the old compressor building. A new dryhouse, built of cement blocks, affords modern facilities for

the workers. Officials of the company are gradually getting a crew together.

► The copper contracts of Copper Range Co. and Quincy Mining Co., as well as the Isle Royale, with Metals Reserve Co. have been extended for March, April, and May. This provides a price premium for over-quota production. The contract terms of the three companies vary somewhat.

► Although the Army has ordered curtailment of servicemen's training at many schools, the program for advanced engineering for several hundred soldiers now at the Michigan College of Mining and Technology, at Houghton, will be continued.

IRON COUNTRY

Plan sponge-iron plant in North Dakota—Wakefield mine may be closed—Lakes to open early

► Oliver Iron Mining Co. is nearing the end of an active winter of mine stripping in the Hibbing-Chisholm district of the Mesabi Range. From the Hull-Rust and other mines, Oliver has been removing stripping material at the rate of over 1,000,000 cu. yd. per month.

► Evergreen Mines Co., at Crosby, Minn., has for several months been exploring the bed of Jeune Lake for iron ore, and recently the drill was moved from Jeune Lake to Portage Lake. Both lakes are on the Cuyuna Range.

► Bureau of Mines representatives from Golden, Colo., are at Grand Forks, N. D., to undertake preliminary work for the construction this spring, at the University of North Dakota, of a sponge-iron plant. The process will involve the development of water gas from lignite. Steam hydrogen is to be obtained from purification of the water gas. The plan as originally announced was to obtain iron ore from Minnesota to be employed with the hydrogen plant for production of sponge iron.

► Unless an intensive program of exploration in virgin territory develops additional iron-ore reserves, the Wakefield mine, on the Gogebic Range at Wakefield, Mich., will shut down, due to ore depletion. This mine started as an open pit 30 years ago and has shipped over 12,000,000 tons. Its peak season was in 1917, when more than 1,000,000 tons was taken out. The last few years it has operated as an underground mine. An extensive drying plant was installed before the first World War, but it operated for only a short time. A steam plant built several years ago to generate electric power for this mine was sold as a unit to India and shipped complete, where it is now in operation.

► At the Newport mine of Pickands, Mather & Co., near Ironwood, Mich., the shaft has been sunk an additional 260 ft. and the 30th level is being opened. A new type of mechanical mucking was used

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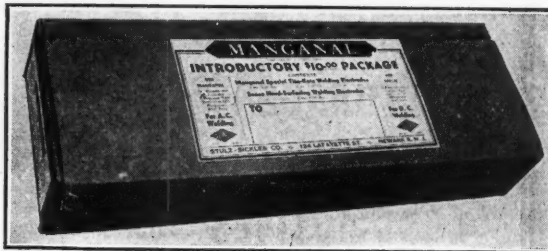
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Iron Country (continued)

in the sinking, 8-ft. cuts being removed by scrapers, loaded into steel trays, and hoisted into skips.

► It is believed that Lake navigation will open about April 1, when an iron-ore freighter of the Inland Steel Co. is scheduled to arrive at the dock in Escanaba, Mich. Ore loading into railroad cars has been started at the Morris mine from stockpile and shaft for three cargoes, and the ore will be in the dock pockets by April 1. Due to the small amount of ice in Whitefish Bay and Duluth harbor, conditions appear favorable for boats to get through by that time.

► The panel of three to arbitrate the grievances between the Inland Steel Co. and the CIO union at the Sherwood mine, at Iron River, Mich., was completed March 14, when the steel company accepted Judge Kenny, of Duluth, Minn., a union nominee, who presides over a U. S. court in the Duluth area. This selection breaks a deadlock in the proceedings lasting almost a month and leading to the creation of an arbitration panel, as all previous nominations were rejected. The panel now consists of V. D. Laing, company member; Sam Swanson, CIO executive, Duluth, union member; and Judge Kenny, who has authority as chairman to name the time and place of meeting. Several grievances are to be settled, the main issue being on the subject of placing two men to a drilling machine in underground workings. This question caused a walkout of three days before it was decided to settle the matter by arbitration.

► At a special meeting on March 16 the City Council and board of review of Bessemer, Mich., tabled a request by Pickands, Mather & Co. for a lower assessed valuation on the Colby and Tilden mine properties, from a total of \$250,000 to \$11,000. The company is negotiating with the fee owners of the Colby-Tilden properties for an option with a view to combining them with the Puritan-Ironton-Yale properties the idea being that this entire group would have to be operated as one mine if such property contained iron ore and there is any chance of mining it out on an economic basis, as explained by General Superintendent Knoll to Mayor Bruno Crenna. He also said: "Unless we can secure this entire group of properties under option on a satisfactory basis, and unless we can substantially reduce the tax carrying charges on these properties, it would not be interesting to us to continue to hold these options."

ALASKA

Alaska Juneau reports loss in 1943 —May reopen small gold mines this year

► Alaska Miners Association, at its recent meeting in Anchorage, protested vigorously and unanimously against the pro-

posal of the Department of the Interior to extend the leasing system to all mineral claims, but urged that the federal government help protect the mining industry against postwar dislocations. The group also asked elimination of the 3 percent gross tax now payable on gold production, and expressed the opinion that taxation in general will be an outstanding issue before the next session of the Territorial Legislature.

► P. R. Bradley, president of Alaska Juneau Gold Mining Co., stated in his annual report that the company suffered in 1943 an operating loss of \$174,346. The Regional War Labor Board recently granted a wage increase of 14c. per hour to Alaska Juneau employees. The local of the MMSW union had asked for 30c.

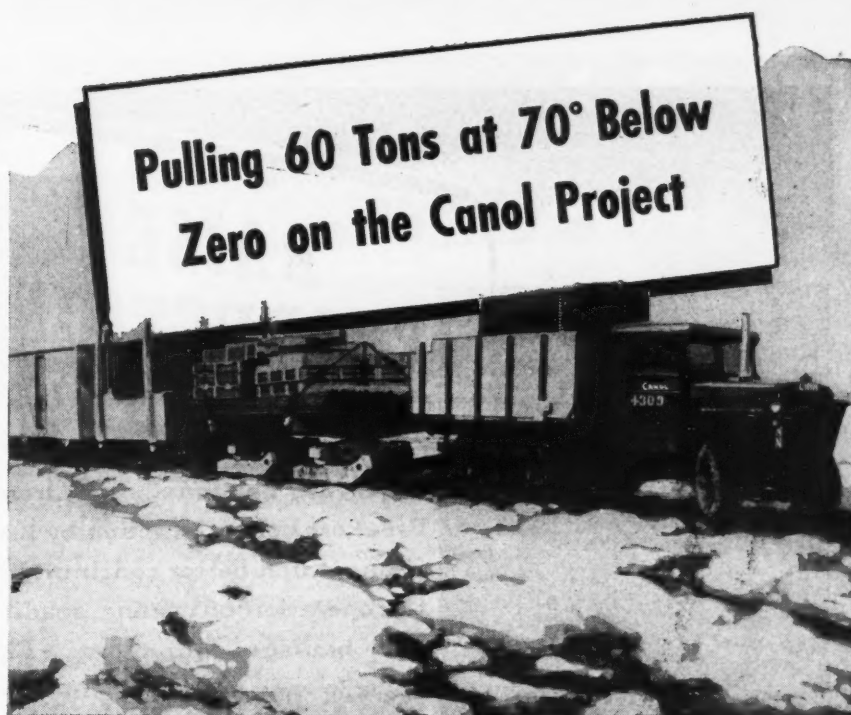
► Charles J. Johnston, president, and Ernest N. Patty, a director, of the Alaska Miners Association, returned recently from conferences in Washington, and they report that small gold mines in Alaska will probably be permitted to resume operation this year, provided the local office of the WMC certifies that manpower is available in the areas concerned. Each mine will be considered as a special case, and applications to the WPB for resumption of work should state the number of men required, the length of the operating season, and whether or not necessary fuel and machinery are available.

► Governor Gruening said recently in Anchorage that he expected mining in Alaska to be resumed on a more diversified basis after the war. He added that it ought to be practicable to use Alaskan coal, and pointed out that at Point Barrow coal is imported at \$60 per ton, although there are coal deposits near by.

CANADA

Dominion's future discussed—CIO wins two gold-mine elections—New Yellowknife strike

► International monetary stability and the opening of trade channels to Canadian exports are paramount issues now under discussion by the Canadian government with Allied representatives. The program for postwar reconstruction is designed to secure greater freedom for world trade than was possible in the years preceding 1939. No major changes have been made in the official trade controls during the past year, and it is recognized that much greater resources have been built up in Canada for export trade during the last four years than had been established at any time before 1939. For the first time since 1942, the publication of figures on Canadian exports indicates a greatly increased productive capacity for external trade. In normal times the main exportable products included more than 90 percent of the non-ferrous base metals, about 70 percent of the wheat, and about 48 percent of the forest products. From 1939 to the end of 1943, exports of non-ferrous metals advanced from \$182,900,000 to \$332,



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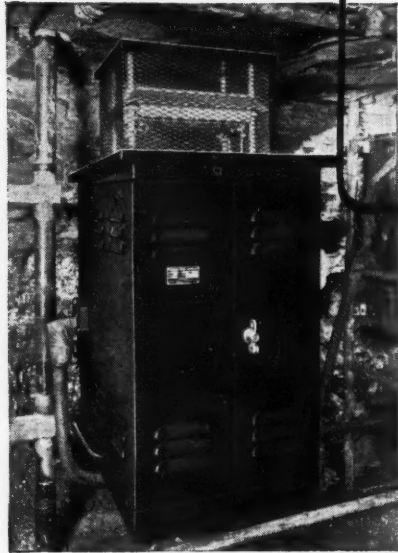
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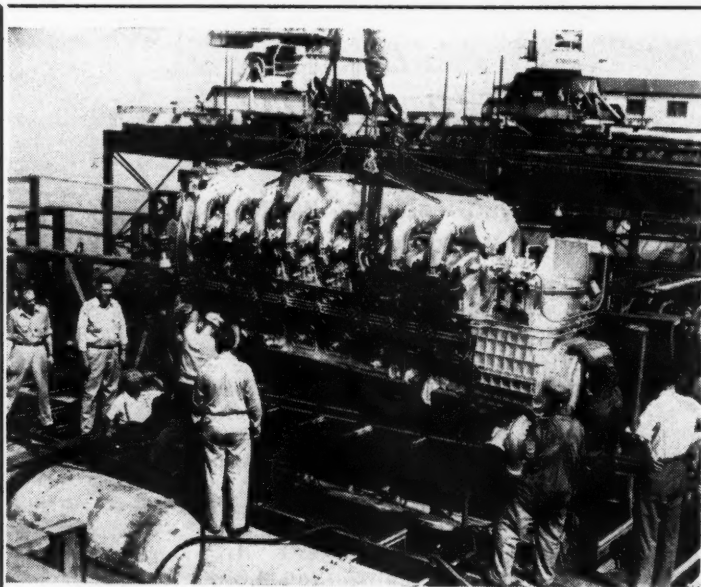
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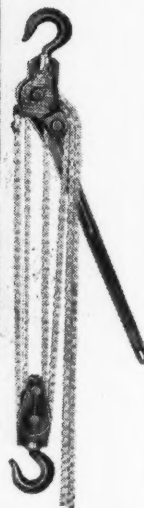
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Canada (continued)

300,000 and non-metallic minerals increased from \$29,300,000 to \$62,200,000, and exports of armament and minerals for armament in 1943 had a value of more than 1 1/2 million dollars. Exports in 1943 were no greater as a whole, in proportion to total production, than in 1939. In consequence, the Canadian standard of living was not unfavorably affected. The national income in 1943 was about 9 billion dollars, approximately 17 percent higher than in 1942 and almost double that of 1939.

► Early in March the International Nickel Co. of Canada, at Sudbury, signed an agreement with the CIO affiliate, Local 598 of the Mine, Mill and Smelter Workers Union. The two leading organizers concerned in the negotiations have been quoted as saying they were "not exactly satisfied with the provisions of the agreement," which did not concede the demands for general wage increases of \$1 a day and a closed shop the union wanted. Workers at the Noranda, Hollinger, and other mines in Quebec and Ontario, where employee-management agreements are now in effect, enjoy the benefits listed in the International Nickel contract, except for the granting of leave of absence for union delegates and officers who attend annual conventions, and payroll deductions for union dues. This settlement at Sudbury does not appear to have added any important benefits that had not already been secured by the employees through previous negotiation procedures.

► Employees at Lake Shore and Upper Canada, two mines in the Kirkland Lake district, voted recently in favor of the Mine, Mill and Smelter Workers Union as their collective bargaining agent. At Lake Shore the vote was 230 for the CIO union and 213 for an employees' committee; at Upper Canada, the vote was 128 for the CIO and 23 for a workers' council. Workers at Kerr-Addison and Bidgood, other Kirkland Lake mines, voted in favor of employee committees several months ago, and other elections are expected in the district in the near future.

QUEBEC

► A notice appears in the Quebec Official Gazette detailing the formation of Arntfield Mining Corp., Ltd., a company organized from the former Arntfield Gold Mines, which was incorporated in 1925 and ceased operating in April, 1942. Letters patent have been issued the new company, capitalized at 3,500,000 shares of \$1 par value. It is planned to carry on a drilling program this spring, following settlement of claims against the company. It is also announced that a magnetometer survey will be made of a promising area in the southern part of the company's holdings.

► Stadacona Rouyn Mines, now operating under five inspectors and a permanent liquidator, George Duclos, was incorporated in December 1925 and placed in bankruptcy in December 1939. Mining,

milling, and development costs in 1942 amounted to \$4.68 a ton, compared with \$4.96 in 1943, not including administration and depreciation. In 1943, production averaged 377 tons a day, the shortage of labor causing the drop from capacity of 475 tons. The liquidator reports that the property will soon be turned over to the shareholders under court supervision. The company has available a reserve of about \$400,000 for use in discharging obligations to the noteholders and creditors. In January 1944, it was reported that ore reserves amounted to 330,599 tons averaging \$6.19 a ton, the tonnage increasing to more than 400,000 in February 1944. On the bottom level at 2,375 ft. a station is being cut, and a new ore length of 340 ft. has been developed on the 2,175-ft. level. The mine manager is George W. Robinson.

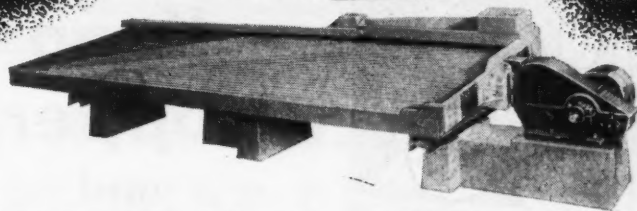
► Norseman Mines has announced purchase of the Smith-D'Aragon claims to increase the holdings in one block to 960 acres located southeast of the Lamaque and Sigma mines. A drilling program has been started, the first hole reported to be in diorite under 50 ft. of overburden. Much of the ground is said to be underlain by granodiorite and other intrusives that have been found to be favorable to ore deposition in this district.

► Unigo Mines, holding properties in five townships in northwestern Quebec, is carrying on a magnetometer survey of promising ground near the east end of the Cadillac-Malartic-Bouzan fault zone in Vauquelin Township. The vice president, Walter J. Blair, has issued a report on the work projected for the eight other claim groups that cover a combined area of 6,591 acres. B. H. Cram is president.

► An extensive program has been planned for the property of Rouyn Merger Gold Mines, in Rouyn Township, as the first move to carry out a systematic investigation of the Cadillac-Malartic-Bouzan regional fault in the section between the McWatter mine and the Kinojevis River. Shareholders of East Rouyn Mines, at a special general meeting, approved the sale of 17 claims to the newly formed company, which has also taken over the 11-claim property of O'Neill Thompson and holdings of the Hosking-Cockeram Syndicate, as well as options on additional claims held by Young and Doyon. Financing arrangements provide for \$75,000 cash from the sale of 500,000 shares to a group including Frobisher Exploration, and stock options provide for \$849,898 in additional funds. Encouraging possibilities were indicated several years ago by underground work and drilling on both the East Rouyn and O'Neill Thompson ground.

► In Joannes Township, the property of Hosco Gold Mines extends east from the Rouyn Merger holdings for a length of 5 miles and covers a broad stretch of favorable structure. A drilling program has been started on the portion west of the block of ground held by McIntyre Porcupine. A second block of ground adjoins McIntyre on the east and is being tested by a geophysical survey preliminary to drilling. Several years ago promising gold values were found in a quartz vein south of

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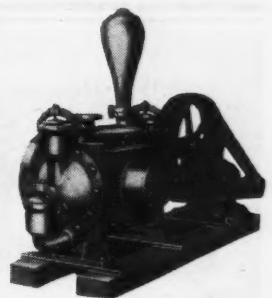
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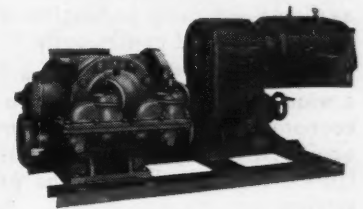
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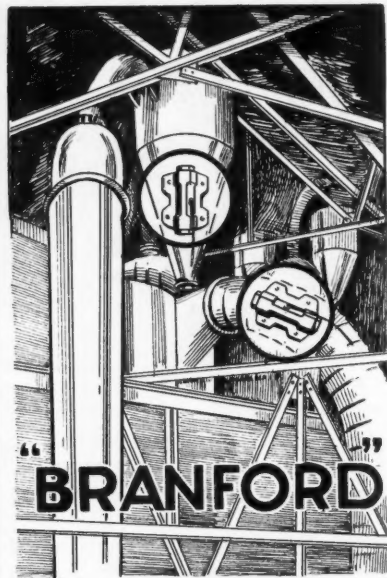
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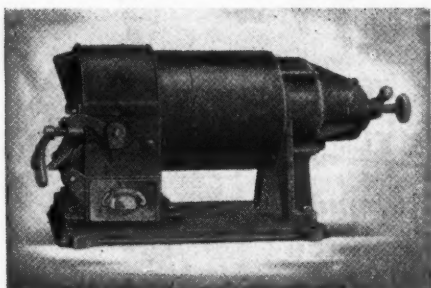


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Canada (continued)

the main fault zone, and it is planned to search below heavy overburden for other gold occurrences along the favorable structure. Work is under the direction of W. J. Hosking, vice president and managing director. Robert Cockeram is president.

ONTARIO

► At Omega Mines the number of men employed has been reduced to 260, and it has been reported that all work is to be stopped unless more workers can be found. During the last six months the loss of employees has resulted in cutting output to 50 percent of capacity. It has been necessary to stop development on the two promising new levels down to 1,975 ft., where an improved grade was reported last summer. The No. 1 vein has shown a marked improvement at depth, indicating a repetition of earlier favorable conditions that were found above 900 ft.

► Results of diamond drilling at the west end of the property of Upper Canada Mines have indicated \$9 ore across a true width of 40 ft. This increases the productive length of the main ore zone to more than a mile, including the two shafts, which are 2,900 ft. apart. Three new levels are being opened from the new No. 2 shaft to a depth of 750 ft. In October 1939 the mill was completed with a 400-ton capacity. War conditions have held it well below its rated volume, and output is now reported at about 200 tons. As a result of recent ore extensions, postwar expansion to upwards of 600 tons daily has been discussed.

BRITISH COLUMBIA

► The Province of British Columbia will suspend application of its Industrial Conciliation and Arbitration Act, at least for the duration of the war, in order to enter into an agreement with the federal government, making the Dominion Labor Code effective in all industries within the Province. The move has met with the expressed approval of labor leaders throughout the Province.

► The British Columbia Miners' District Council has been formed following a two-day conference of delegates from the various Provincial locals of the International Union of Mine, Mill and Smelter Workers. The new body has endorsed a six-point brief asking the following amendments to the Metalliferous Mining Act: (1) Inclusion of the union dues check-off system as contained in the Mines Regulations applying to coal mines; (2), all employees, before holding the job* of shift boss or a higher post, to have a certificate of competence issued by an examining board, particularly in the handling of explosives; (3), in case of a serious fatal accident, a representative of the workmen to accompany an inspector on his investigation; (4), establishment of the right of workers to cross-examine witnesses in any inquiry called by a coroner; (5), inspectors in metallurgical plants and metalliferous mines to be appointed from men having ex-

perience as metal miners; (6), set standards for sanitary conditions and fire prevention to apply to all bunkhouses and living quarters. The Council adopted a resolution opposing affiliation with "any particular political party"; endorsed the parent organization's no-strike policy; demanded more beer; and approved the Province-wide rehabilitation conference. It also endorsed the application of the Kimberley local to the National War Labor Board for a basic wage rate at the Sullivan mine and mill.

► The report of The Twin "J" Mines, Ltd., Wartime Metals operation at Duncan, Vancouver Island, covering the period from incorporation to Dec. 31, 1943, shows production royalties on copper and zinc concentrates of \$10,711. Early milling operations revealed a more intricate metallurgical problem than had been indicated by laboratory tests. However, alterations in the circuit have effected an improvement of 11 percent in copper, and 8 percent in zinc recovery. At the company's annual meeting, shareholders were advised by Col. E. M. Thomson, president, that the average cost per pound of copper produced, which in 1943 was 7½¢, has fallen to 5.7¢ at present, thus making the Twin "J" one of the lowest-cost copper-mining operations conducted by Wartime Metals Corp. The average monthly recovery of precious metals, which in 1943 had an estimated value of \$4,600, rose to \$8,094 in February 1944. Development work to date directed towards making known ore available for stoping has progressed to a point where exploration may be undertaken in quest of new ore.

► February production of Cariboo Gold Quartz Mining Co., Ltd., was 1,351 oz. gold, valued at \$52,013, from 2,950 tons of ore treated. More men are now available to this operation, and a steady improvement in production is anticipated.

► The acquisition of additional underground crew has enabled Hedley Mascot Gold Mines, Ltd., Osoyoos district, to advance development on a scale permitting a resumption of milling operations before the end of the current month. Milling was suspended last September in order to concentrate the limited crew on mine development.

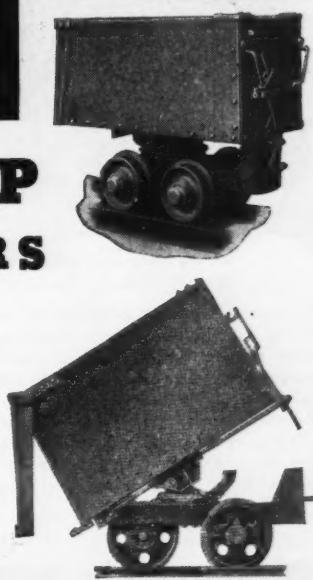
NORTHWEST TERRITORIES

► A diamond-drilling campaign conducted by Frobisher Exploration Co. on the property of Giant Yellowknife Mines was reported recently to have outlined a gold ore zone about 1,400 ft. long, and traced in places to a width of 100 ft. Assays of core samples taken from the ore, as thus far reported, have ranged from \$2.31 to \$29.64 per ton. An option on controlling shares of Giant Yellowknife was obtained by Frobisher Exploration, a subsidiary of Ventures, Ltd., in July, 1943, and work began soon afterwards. No attempt has as yet been made to estimate tonnage or value, but the indication of the presence of a medium-grade, large-tonnage orebody is strong and the drilling is being continued. With regard to the subsequent

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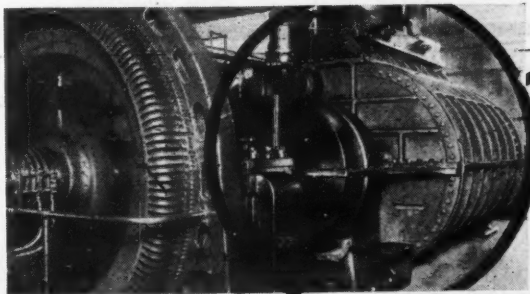
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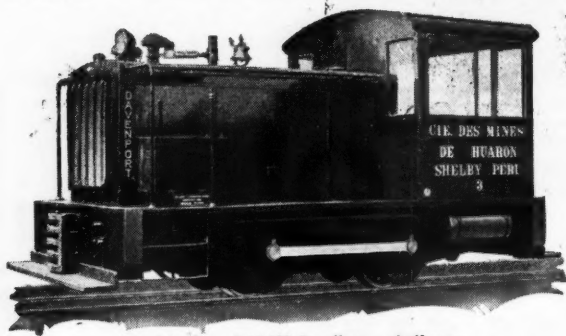
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Canada (continued)

veloped there, it has been noted that arsenopyrite is present in the ore. Glyn R. Burge, president of Frobisher, is now also president of Giant Yellowknife, and it has been reported that Frobisher has exercised its option on 1,000,000 shares of Giant's stock.

YUKON TERRITORY

► Yukon Consolidated Gold Corp., operating in the Klondike, had a production of \$1,353,243 in 1943, from dredges Nos. 3, 4, 7, 10, and 11, compared with \$2,834,630 in 1942. Labor was not sufficient for further operation, although a small amount of ground preparation was done. Full-scale operations require 700 men, but in 1943 fewer than 200 were available, and in 1942 the number of men averaged 400. A fire on July 13, 1943, caused by lightning, destroyed dredge No. 3. Loss was covered by insurance to the amount of \$122,791, approximately the value of the dredge after allowance for depreciation. Although the outlook is not good, it is said to be better than it was at the end of 1942, and the shutdown feared last year on account of labor shortage it is believed can be avoided.

MEXICO

Uneasiness prevails regarding future—Wage increase act is source of trouble

► March found Mexican mining men uneasy, following the sharp rise of pessimism in February caused largely by the break in the price of mercury. The recent announcement of the cessation of "eligible producer" tungsten purchase contracts by the United States has generated further gloom. Producers of copper, gold, and silver, however, continue to do well, though some grumbling is heard regarding heavy taxation on these items.

► Ing. Andres Ortiz, new general manager of the National Railways, has denied newspaper reports that failure of the railroad to move freight rapidly is caused by inefficiency rather than shortage of rolling stock. Mr. Ortiz stated the company had only 10,356 cars at its disposal, instead of 22,000, as press reports had indicated.

► Currently only two strikes in the mining industry await adjustment. One is against Mexico's only mica-mining company, the Cia. Mexicana de Mica, in Oaxaca, where workers are demanding that legal minimum wage rates be paid and that the October nation-wide pay increase be granted at the mine. The company states that its business does not warrant any pay increases. The other strike is against the Cia. Arrendataria Tepozan y Anexas, in Zacatecas, where the point at issue is also the compulsory wage increase act.

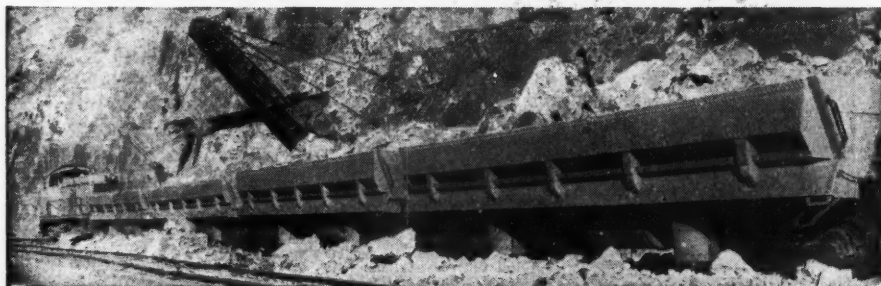
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► Cia, Minera de Real del Monte, Pachuca, Hidalgo, is the subject of a debate that has not yet reached strike proportions. Its more than 6,000 employees have asked that the company be forced to comply with the compulsory wage increase act, although the company increased wages in March, 1943, and would therefore be exempted from the act's provisions. The workers hold that the company's pay grant was effective as of December 1942, and that the law is therefore applicable.

► A five-year plan of extensive exploration of Mexico's mineral resources is provided for in an agreement among the Ministry of National Economy, the National University of Mexico, and the Federal Committee for Scientific Investigation. The Committee will supervise the work, for which 200,000 pesos (\$42,500) has been appropriated as a starter.

► While other labor organizations are protesting against the national social insurance law, sponsored by President Manuel Avila Camacho and put into effect last Jan. 6, because they aver that pay discounts under the act work a hardship upon them, the miners' union appears to have accepted the measure rather well. At least, the miners' union is not among the groups protesting.

► The Ministry of Finance has announced a five-year grant of exemption from federal taxes on its production to Altos Hornos de Mexico, S.A., the American-Mexican enterprise engaged in constructing an iron and steel works at Monclova, Coahuila. The company will also be able to import duty-free during that period such machinery and materials as it must purchase outside Mexico. Altos Hornos recently increased its capitalization from 5,000,000 pesos to 17,690,000 pesos (\$3,655,000) in order to finance its expanded activities. The first unit of the new plant is scheduled to begin operating in April.

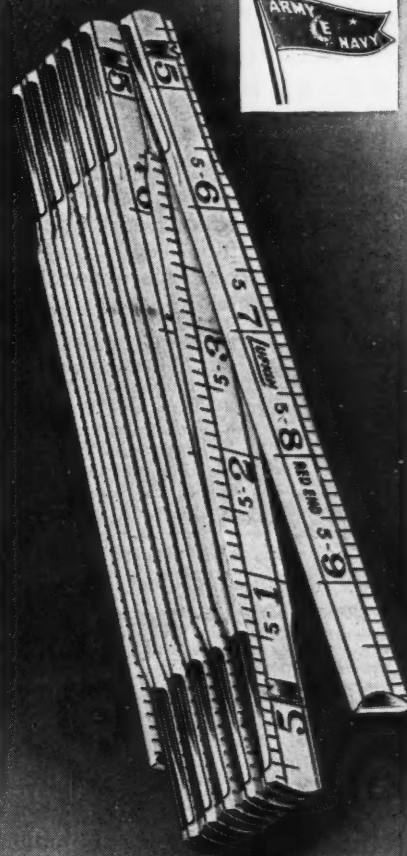
VENEZUELA

Bethlehem's El Pao mine has 700 men on construction work—Gold mines struggle along

► The recent visit to the United States of General Isaias Medina A., President of Venezuela, is believed by many in Caracas to have been at least partly responsible for the new large construction programs of the Sinclair and the Standard Oil interests, the announced intention of Henry J. Kaiser to interest himself in the country's development, and the decision of Harry Winston and Maurice Krengel to send men to examine the Venezuelan diamond regions.

► Output of gold and diamonds dropped in 1943, the former because of lack of supplies and equipment, and the latter because of the disastrous floods mentioned in a previous report. New Goldfields of Venezuela suffered a crushing blow last

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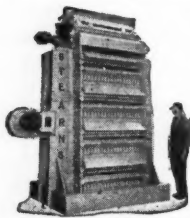
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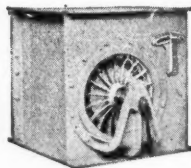
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Venezuela (continued)

October when fire destroyed the company's principal warehouse and, with it, about \$275,000 worth of equipment and supplies. During 1943, the company milled an average of 8,250 tons per month, and the average yield of gold was about 4,240 oz. per month. Fewer than 750 men were employed, as against 1,760 in normal times. Development is at an absolute minimum, and higher-grade ore is being mined in an effort to make ends meet. Because of cyanide shortage, the mill tailing loss is nearly trebled and the tailing is being stored in the hope of re-working it eventually. The U. S. government has promised New Goldfields 650 tons of supplies in 1944, which should enable operation to be maintained on the present basis.

► Cia. Francesa de la Mocupia was able to hold its output at about 1,900 tons per month, which yielded an average of 1,200 oz. of gold. One unit of the company's power plant is shut down because of lack of spare parts, but New Goldfields has come to the rescue with sufficient of its surplus power to permit Mocupia to continue mining, although the ore must be sent to its El Peru mill for treatment. The labor force is down from 300 to 220 men. The Mocupia mill, at La Experiencia, has been run a few days each month on small lots of ore brought in by prospectors. This neighborhood merits closer investigation after the war.

► The Vuelven Caras mine, owned by a Venezuelan syndicate, shut down temporarily because of lack of supplies, is again being worked in an attempt to find the faulted portion of the original high-grade oxidized vein. Sulphide ore is available in the present workings, but the company must continue seeking the easily-mined oxidized ore because it does not have, and cannot get, equipment to mine and treat the sulphide ore.

► Toward the end of 1943, interest in the Botanamo area revived, and about 100 prospectors are now in that region looking for, and working on, outcrops of two rich lodes.

► A rich pocket of gold was discovered a few months ago at Carrizal near the lower Caroni, and about 40 men are working in that region.

► In the past six months, there has been a strong revival of interest in the diamond-producing Gran Sabana region, and it is reported in Caracas that certain financial interests are trying to have the government reopen the area to large-scale development. This would require the assent of the Congress, and there has been no indication as yet that the government intends to take such action.

► Great excitement was caused locally by the recent announcement that Harry Winston, Inc., of New York, had purchased the diamond known locally as the "Barrabas," but which later was named "El Libertador," for a price reported as \$62,000, to be divided equally among the four discoverers. It is estimated that about 1,200 men are now working in the diamond areas, and more would be put to



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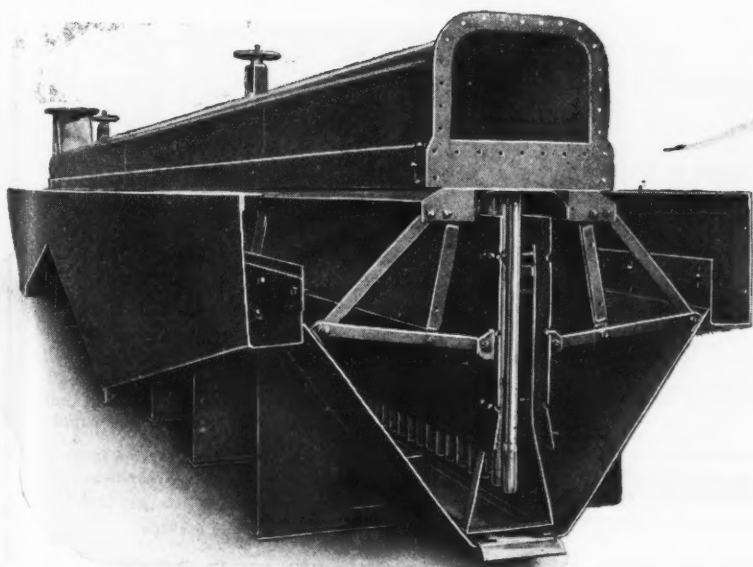
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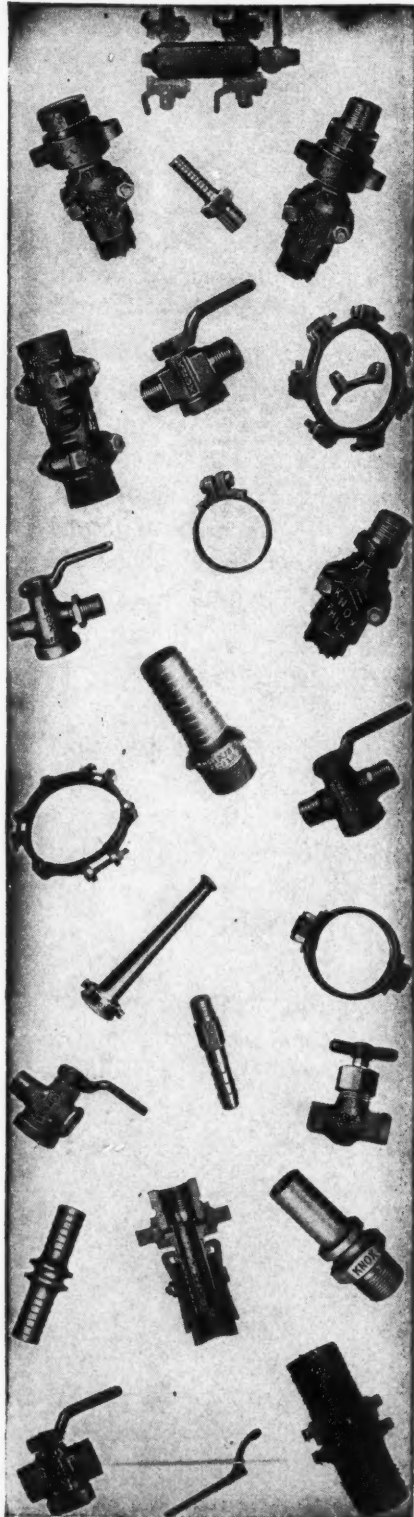
April, 1944—Engineering and Mining Journal

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Venezuela (continued)

work if the rivers were to fall low enough to permit entrance to other gravel beds.

► Building material continues to flow into the Port of Palua destined for the Venezuelan Iron Co.'s development at El Pao, where about 700 men are employed on construction work. The road linking the port with the mine is completed, and work on the ore-loading facilities is progressing. Output of this company, a subsidiary of Bethlehem Steel Co., will amount to about 1,750,000 tons of high-grade iron ore per year. The mine will be a typical open pit, worked in 30-ft. benches. Diesel shovels will load the broken ore into 30-ton cars, and trains of these cars will be hauled by diesel locomotives over standard-gauge track to Palua, 60 km. away. A labor force of about 800 men and a foreign staff of 30 engineers and supervisors will be required. Palua is on the Orinoco River, and it has not yet been determined whether the river will be dredged to allow ocean-going steamers to reach Palua, or the ore be transhipped at some other point, such as Trinidad. Other companies have been prospecting the Imataca Range, which includes El Pao, and their work indicates that the iron-bearing formation extends nearly 150 miles east of El Pao.

► The Ministerio de Fomento reported last April that negotiations were proceeding between a Venezuelan company and the U. S. government with the purpose of establishing a Venezuelan steel industry. The proposed plant would have an annual capacity of 40,000 tons of steel.

► Three engineers, sent to Venezuela by Henry J. Kaiser, arrived during the second week of March. They expect to spend about ten days in hurried inspections of Venezuelan cement projects, iron-ore deposits, and oil fields.

► No official news has been released of developments at the asbestos mine of Cia. Minas de Amianto de Tinaquillo, but it is reported that a priority has been granted for the necessary treatment plant and that a \$200,000 loan has been obtained from a U. S. bank. The Canadian technical adviser, Michael Messel, is in Venezuela, and it is expected that the plant will soon be installed. The power plant is being tested, and it is expected that about 300 men will be employed at the mine by July.

BOLIVIA

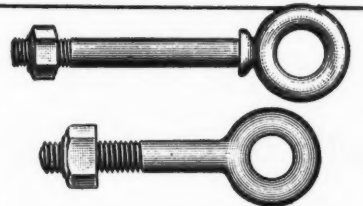
Metal producers worried by lack of MRC contract renewals—Banco Minero aids antimony miners

► Last year, Bolivian exports of minerals and concentrates reached relatively high figures under the impetus of extraordinary war demands. These figures, together with a review of the present marketing situation with regard to tin, are given on page 104. Further information on other Bolivian mining affairs is given in the following paragraphs.

HERE'S A LINK
FREE FROM PLAY
OR
SHEARING ACTION
ON THE RIVET

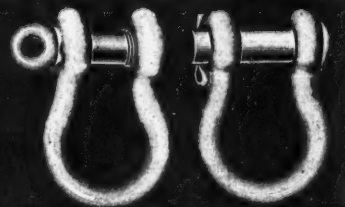


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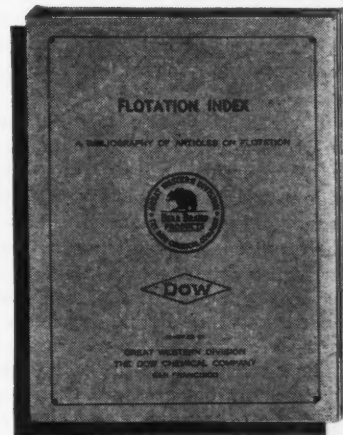
THE 14TH ANNUAL ADDITIONS

FOR THE

FLOTATION INDEX

The publication of the 1944 supplement to the Flotation Index marks the fourteenth consecutive year of the compilation of the most complete bibliography of the available material on the flotation process. Articles, reports and patents from every possible source have been reviewed to bring the subject matter up to date. Present holders may have this latest supplement to make their Index current. Those who have not previously received a copy of the Index may request the entire work.

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Bolivia (continued)

► The contract for the sale of Bolivian tungsten to Metals Reserve Co. expires on June 30, 1944. Negotiations looking toward an extension of this contract have come to a standstill.

► The Metals Reserve contract covering Bolivian antimony expired on Dec. 31, 1943, and although Banco Minero de Bolivia, the government intermediary in the sale of antimony, has announced that it will continue its purchases until March 31, 1944, no one seems to know where and on what terms these stocks will be sold, nor can anyone tell exactly what will happen to the Bolivian antimony industry after that date. The general opinion is that the industry will collapse in the near future because of Mexican competition and the large stocks of the metal currently held in the United States. The producers have asked for government aid, but nothing definite has as yet been offered.

► Bolivian copper producers are in even more of a quandary. Their contracts with the United States for the sale of copper ores and concentrates ended on Feb. 29, 1944, but on March 2, a La Paz newspaper quoted the Bolivian Secretary of Labor as saying that Mr. P. Kazen, representative in Bolivia of the Office of Economic Warfare, had advised him officially that the United States would continue buying all the Bolivian output of copper, which implied the possibility of a renewal of the contract. The next day, however, another newspaper quoted Mr. Kazen as denying that he had said anything bearing on a renewal of the copper contract.

► Two important new plants for the beneficiation of tin ores are expected to begin operation within a few months. One is the Tainton plant, at Compania Unificada de Potosi, a Hochschild operation; and the other is the sink-and-float plant at Catavi, which is being erected by Patino Mines & Enterprises. The former uses a process developed in Baltimore by U. C. Tainton, and will have a capacity of about 250 tons of ore daily. It will employ fine grinding of the ore, followed by a roasting operation in which the tin is volatilized and then condensed and purified. The sink-and-float process has already been applied successfully at the Hochschild Colquiri property, but the new Catavi plant is of special interest because of its association with Patino, the biggest single tin producer in the world.

AUSTRALIA

**Edna May Mines reports a loss—
Broken Hill South seeks tax exemption—Mt. Morgan needs men**

► Edna May (W. A.) Amalgamated Gold Mines, N. L., is an amalgamation of several previously worked mines at Westonia, which is situated to the west of Southern Cross. The company has had a heavy task in reconditioning the old mines, bringing the workings into satis-

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HARDINGE

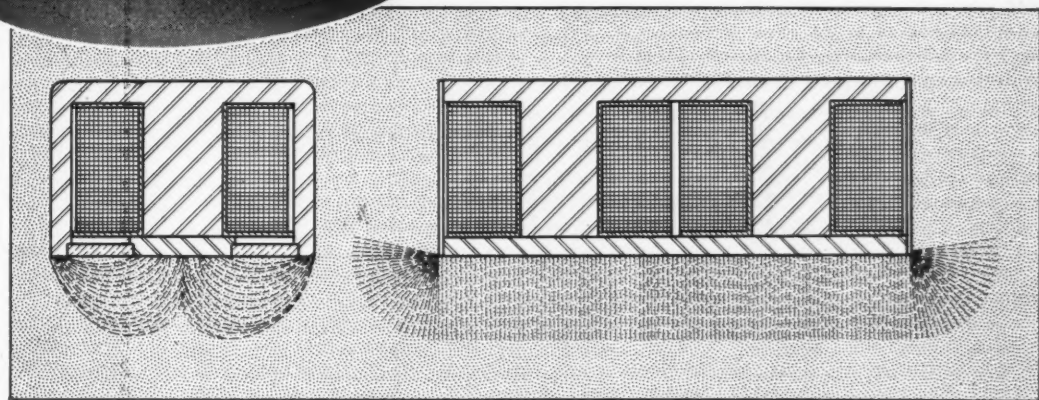
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Australia (continued)

factory order for coordinated working, and in dealing with water at the rate of 50,000 g.p.h., one of the few heavy makes of water in the State. After eight years' operation, the company paid a first dividend last year but incurred a loss of £A11,593 in the financial year which closed on June 30, 1943, a result largely due to shortage of labor. During the period, 10,673 tons of ore was milled for a recovery by amalgamation of 2,996 oz. of gold, or 5.61 dwt. per ton, sands stacked for cyanidation assaying 1.41 dwt. per ton, which gave a total head value of 7.02 dwt. per ton, a decrease compared with previous periods. In sands treatment, 10,098 tons was put through the plant for a recovery of 657 oz. of gold, or 1.30 dwt. per ton, the average assay of the residues being 0.35 dwt. per ton. The ore carries scheelite, and tests on the old Edna May tailing dumps showed that re-treatment for the recovery of tungsten can be done profitably. A plant is therefore being erected, with a capacity of 200 tons per day. The orebodies are quartz, or pegmatite quartz. There is little coarse gold, it being, in general, finely disseminated. Accessory minerals are pyrite and marcasite, in small quantities, with scheelite, wolfram, molybdenite, and a little galena. The lodes now worked are from 15 in. to 72 in. in width and the lowest level is at 575 ft. from surface. The country rock is greenstone and gneiss, intersected by granitic dikes up to 20 ft. wide, which cut the lodes more or less at right angles. Some basic dikes are also present. Costs for the past financial year were: mine unwatering, 21.9s. per ton; mining and delivery, 35.0s.; ore treatment, 12.3s.; general expenses, 3.4s.; mine development, 15.8s.; total, 88.4s. per ton.

NEW SOUTH WALES

► In the year ended June 30, 1943, Broken Hill South, Ltd., Broken Hill, earned a net profit of £A231,795 and paid dividends totaling £A240,000. The usually full operating statistics made available by the company are no longer issued, in accordance with wartime regulations. Ore reserves were estimated at 1,950,000 tons, disregarding ore disclosed by diamond drilling only or by limited development, which refers particularly to the western orebodies on the 1,370 ft. and 1,480 ft. levels. Ore below the 1,480 ft. level is also excluded with the exception of one section of 80,000 tons. No information has been released as to treatment beyond the statement that production was less than in the previous year and the average grade of ore slightly lower. Metal recoveries for lead and silver were the highest yet attained. The company has acquired the principal mine leases formerly held by the Broken Hill Proprietary Co., Ltd., and the Sulphide Corporation, Ltd., to the northward of its own leases and also other leases to the southward. Investigations and explorations will be undertaken. The silver-lead-zinc orebody—the world's greatest—may possibly have a counterpart or repetition at greater depth, associated with the main line of shearing. The prospect is highly

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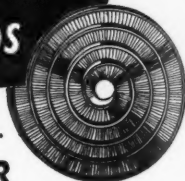
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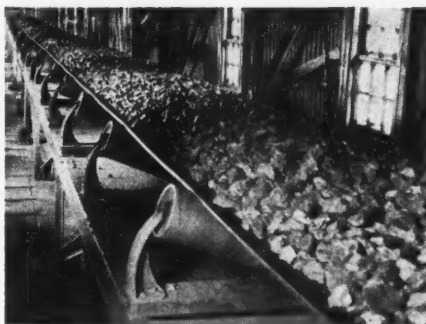
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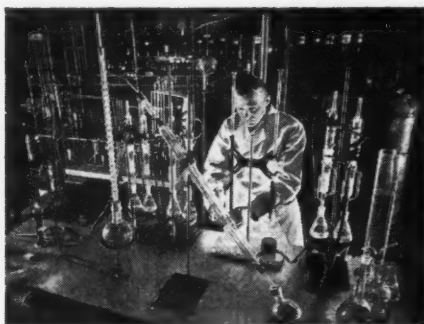
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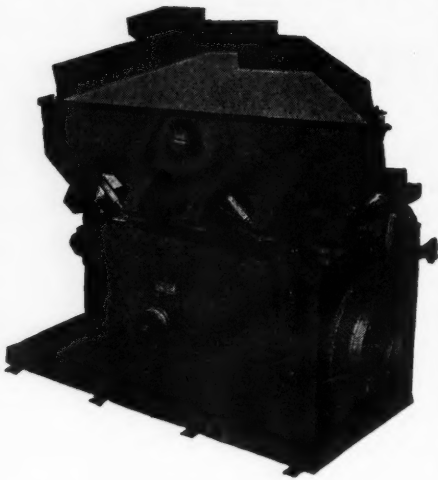
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Australia (continued)

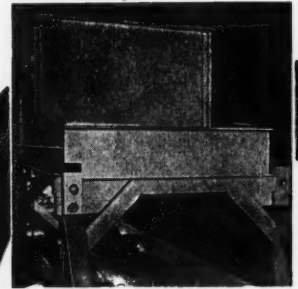
speculative but will be systematically explored by deep drilling as soon as equipment and manpower are available. The company, in common with the other companies on the field, has been excluded from the limited measure of taxation exemption granted to companies producing other base metals. Requests for reconsideration have failed, but the government has offered to have specific claims for exemption by individual companies examined. In reviewing the future of the company it was stated that the mine ore reserves, together with recoverable remnant ore on the adjoining Central mine, and with incompletely developed and prospective ore, should allow the company to continue as a separate producer for seven or eight years on a scale equal to full output.

► North Broken Hill, Ltd., Broken Hill, in the year ended June 30, 1943, earned a net profit of £A288,004, after providing £A115,000 for taxation and royalty and £A75,000 for depreciation. Profit was less than in the previous year, due to slightly lower grade of ore treated, lower output from the mine, rises in costs, and lower investment income. In compliance with the request of the Commonwealth government, no information relating to production is given. Development work was carried out on a scale comparable to previous years, and ore reserves are in a sound position.

QUEENSLAND

► At the annual meeting of Mt. Morgan, Ltd., it was stated that at July 1, 1937, ore reserves were estimated at 7,307,329 tons assaying 4.26 dwt. gold and 1.77 percent copper, and overburden was estimated at 21,000,000 tons. Since then, 10,764,851 tons of overburden have been removed and 1,098,965 tons of ore treated. Of the 10,764,851 tons of overburden, 3,683,781 tons have been milled and 7,081,070 tons, carrying insufficient values to mill, have been discarded, the cost of the latter item being £A752,699. It is hoped that by the end of the present financial year an additional 1,800,000 tons of overburden will be removed, of which 600,000 tons will be milled. The greatest problem facing the mine is shortage of manpower, and the position is serious. There are insufficient machine miners to break ore, and practically no men are available for essential development work. Consequently, No. 1 mill through-put is considerably less than it should be, and as faces from which ore can be obtained are restricted, it is impossible to maintain satisfactory grade. Prior to the declaration of war, the company had 1,101 men employed, but the number at present has decreased to 1,010. Reduction of open cut labor is serious. Maintenance of plant is steadily becoming a more costly item and at this time replacement of such items as shovels operating in the open cut is impossible. Construction of the new reverberatory furnace is almost completed, having been greatly delayed by lack of labor and by slowness of material supply.

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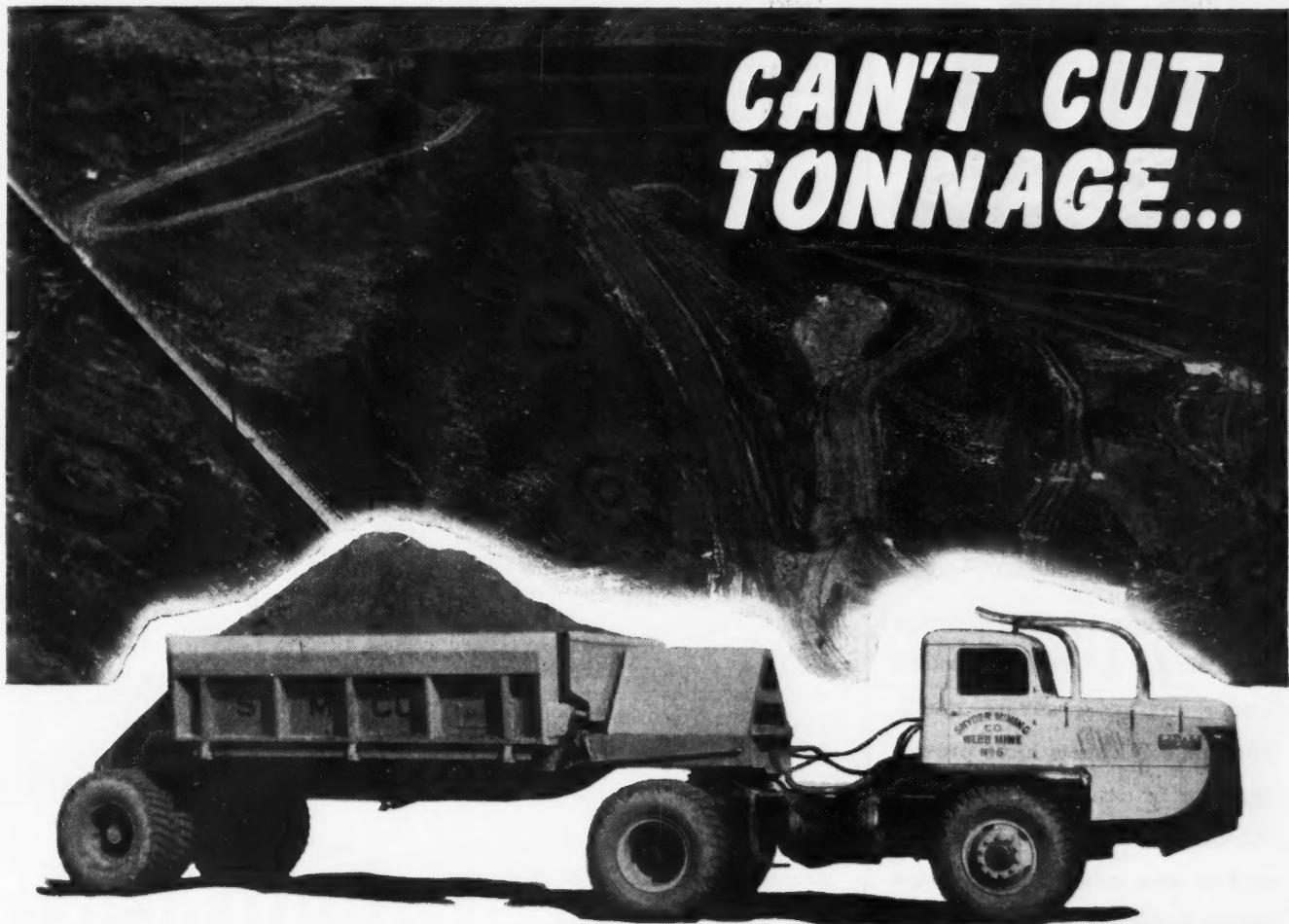
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Mine operators sometimes needlessly sacrifice tonnage by considering their roads suitable only for small trucks. Yet Walter Tractor Trucks haul 35-40 ton payloads over some of the most difficult layouts in the iron country.

Such hauling brings into full play the safety and maneuverability features of Walter Tractor Trucks: Engine forward design provides short wheelbase for small turning radius, scientific weight distribution for stability; hydraulic steering and powerful air brakes assure effortless, safe control; Walter Four Point Positive Drive lessens the danger of skidding by preventing wheel spinning on soft or slippery surfaces.

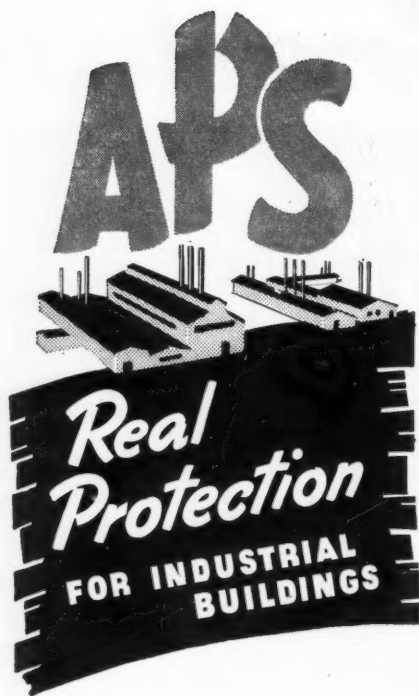
Because the Walter Four Point Positive Drive completely converts engine power into great tractive

power in all FOUR driving wheels, Walter Tractor Trucks are moving 35-40 ton payloads 25 m.p.h. on the level, 8 m.p.h. on 10% grades, even up 15% and 20% grades.

The complete integration of these and other features, such as the Suspended Double Reduction Drive, Tractor Type Transmission, Automatic Locking Differentials and 300 H.P. motor, makes Walter Tractor Trucks unexcelled in open pit iron ore hauling. Write for the proof, today.

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PROTECTED STEEL PRODUCTS

General Office and Plant,
WASHINGTON, PA.

Publications Received

(Continued from page 106)

Chamber of Mines of Rhodesia. Report for 1942. Issued at Bulawayo, Southern Rhodesia, Africa. Pp. 50.

Directory of Washington Mining Operations. Information Circular No. 9. Division of Mines and Mining, Olympia, Wash. Pp. 36.

Iron Ores of Cle Elum District, Washington. By Carl Zapffe. State Division of Mines and Mining, Olympia, Wash. Pp. 27.

Mineral Resources of Minnesota. By W. H. Emmons and Frank F. Grout. Bulletin 30. Pp. 149. Price \$1.

New List of Standards. American Standards Association, 29 West 39th St., New York. Pp. 23.

Mining Industry of Idaho, 1943. Annual report of State Inspector of Mines, Arthur Campbell. Boise, Idaho, Pp. 251.

Georgia Mineral Producers, Directory of. Issued by Georgia Department of Mines, Mining and Geology, Captain Garland Peyton, Director, Atlanta, Ga. Pp. 25.

Postwar Planning: I—Guide to Internal Reorganization; II—Guide to Postwar Sales Planning. Two pamphlets published by National Association of Manufacturers, 14 West 49th St., New York 20, N. Y.

Qualities of a Good Boss. A practical self-rating check-up on 15 outstanding qualities of a good boss, for persons in supervisory positions. By Glenn Gardiner. Elliott Service Co., New York, N. Y.

Director of the Mint. Annual Report for Fiscal Year Ended June 30, 1943, including report on production of precious metals, calendar year 1942. Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. Pages 107. Price 50¢.

Illustrated Technical Dictionary. Edited by Maxim Newmark. Philosophical Library, New York. Pages 352. Price \$5.

Directory of the American Council of Commercial Laboratories. A. J. Nydick, Executive Secretary, 63 Wall St., New York 5, N. Y.

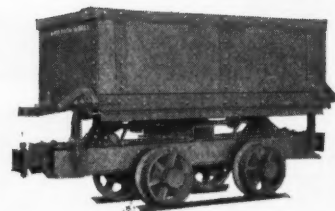
The U. S. Geological Survey has issued the following bulletins. Copies may be obtained from the Superintendent of Documents, Washington, D. C., at the price stated in each case:

"Occurrence of Manganese in Eastern Aroostook County, Maine." Bulletin 940-E. Pp. 125-161, plus maps. Price 25c.

"Geology and Ore Deposits of the Shafter Mining District, Presidio County, Texas." Bulletin 928-B. Pp. 45-125, plus maps. Price 65¢.

"Geology and Ore Deposits of the Cottonwood-American Fork Area, Utah." Professional Paper 201, plus 19 separate maps. Price \$1.75.

"Vanadium-bearing Magnetite-Ilmenite Deposits Near Sanford Lake, Essex County, New York." Bulletin 940-D. Pp. 99-123, plus maps. Price 60¢.



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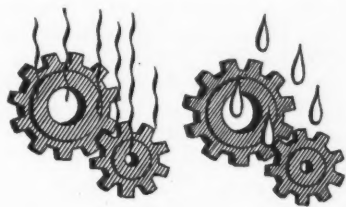
BUILDERS-PROVIDENCE

MINERS!

Here's a grease that protects machinery from heat and water

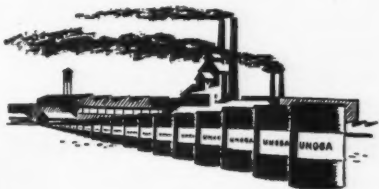
Because many machines used by the mining industry operate at high temperatures one time and under wet conditions the next, a grease that can take both heat and water is a real necessity.

If you've been wondering if such a grease is available, the answer is—Unoba—a Union Oil Company



product. Unoba employs a *barium* soap base that imparts two very desirable characteristics to grease (1) a high melting point (2) high resistance to emulsification with water. Unoba will give satisfactory lubri-

cation at temperatures as high as 250 degrees F. It will protect moving parts completely submerged in



water. It's one of the most versatile greases yet discovered by modern research.

Today Unoba is at work in many mines, in lumber and steel mills, on construction jobs, on farms... it's doing hundreds of different jobs in almost every type of industry.

So if you've needed a dual-purpose grease—one that won't run off when bearings and gears get hot, or wash

off when there's water present—order a supply of Unoba today.

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EQUIPMENT NEWS

Rubber Filter Medium

A filter material containing as many as 6,400 perforations per square inch that is made of rubber latex has been developed by U. S. Rubber Co., Rockefeller Center, New York, N. Y. Known as multipore, the material, because of its scarcity, is being used only in filtering operations of high priority. Of particular interest to the mining industry, the manufacturer says, is its use in filtering flotation concentrate for an iron mining company. In this service, ordinary filter material lasted only a week, but multipore filters are said to have lasted since their installation nearly two years ago. Production on each filter is said to have increased from 200 to 400 hours per year.

Diamond-Dressing Tools

Calder Mfg. Co., Lancaster, Pa., announces that it now has available a line of diamond-dressing tools in addition to the Huntington-type grinding wheel dressers,

which the company has made for the past 47 years. The Calder "Ga" diamonds, as they are called, are supplied in all sizes and types of nib for any kind of diamond-dressing requirement. The company is also manufacturing for the first time a line of diamond hand tools.

Continuous-Stream Conveyor

Chain Belt Co., Milwaukee, Wis., announces the manufacture of a new conveyor-elevator system to be known as the Rex Uni-Flo and to be used in handling free-flowing bulk materials. The conveyor is composed of a chain belt equipped with closely spaced carrier flights and operating in an inclosed casing. With the entire cross-section of the casing and all the intra-flight space solidly filled with the conveyed material, a continuous flow results. The system is said to include a unique discharge mechanism, a self-feeding arrange-

ment that eliminates auxiliary feeding devices, and a general design that reduces churning and degradation of materials to a minimum.

Road-Sweeping Magnets

Stearns Magnetic Mfg. Co., Milwaukee, Wis., announces that it has designed a rectangular magnet suitable for attachment to the front of a car or truck for the purpose of cleaning metal objects out of haulage roads. The magnets come in 18-in. widths, and in 60-in. to 90-in. lengths.

INDUSTRIAL NOTES

Joshua Hendy Iron Works, Crocker-Wheeler Electric Division, announces the appointment of R. D. Ulrey as manager of the new Los Angeles, Calif., office of the company.

Archie Chandler, vice president of American Pulley Co., Philadelphia, Pa., has announced his retirement from active sales management of the company. He will return to his former home in San Francisco, Calif., to direct West Coast sales activities of the company.

Vulcan Iron Works, Wilkes-Barre, Pa., announces the appointment of Howard G. Jones as New York representative and the appointment of Joseph F. O'Brien as assistant to the president. Mr. O'Brien will have charge of all matters relating to operation and production.

George B. Doner has been promoted to the position of sales manager of the rock-drill division of Chicago Pneumatic Tool Co., New York, N. Y.

H. C. Allington has been appointed sales research manager of Wickwire Spencer Steel Co., New York, N. Y.

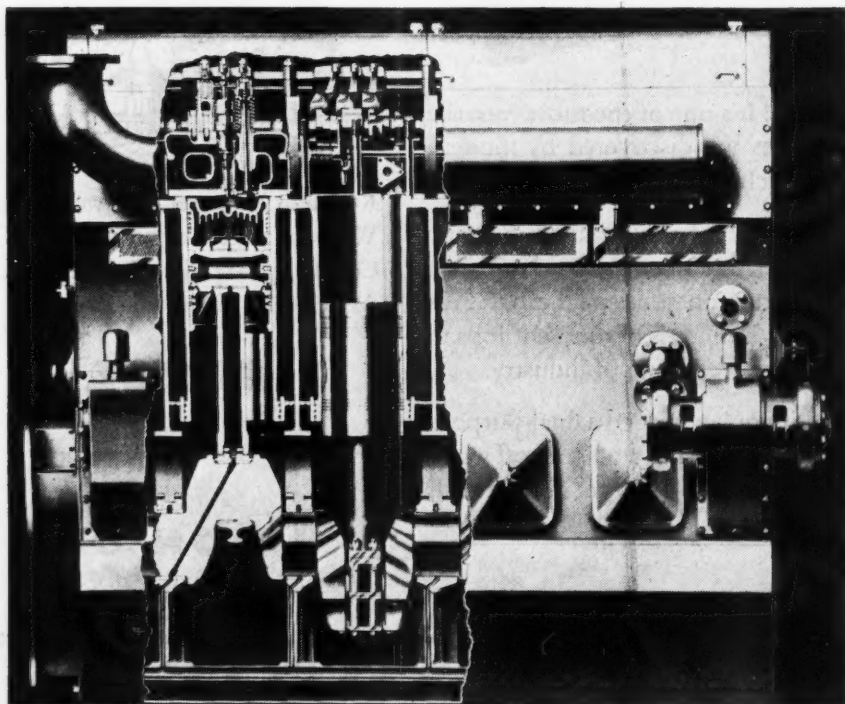
Paul M. Snyder has been appointed sales manager of Climax Molybdenum Co., with headquarters in Canton, Ohio.

New Heavy-Duty Diesel Engine

The new Series 50 diesel engines, recently introduced by Joshua Hendy Iron Works, Sunnyvale, Calif., are said by the manufacturer to incorporate a wide range of modern design features into one model. Hendy diesels are 4-cycle, 12-in. bore, 15-in. stroke, and are normally rated at 83.3 hp. per cylinder at 500 r.p.m.

Features listed by the manufacturer in-

clude: unit-type fuel pumps and injectors combine with overhead camshafts to reduce the number of working parts; improved valve and rocker-arm design eliminates side thrust on valve stems; oil-cooled pistons; welded-steel engine bed and cylinder block; positive automatic lubrication throughout. Speed is regulated by a mechanical or a hydraulic governor.



BULLETINS

Diamond Drill Bits. Wheel Trueing Tool Co., Detroit, 6, Mich., is preparing a series of booklets describing its line of diamond tools. No. 1 covers the company's Tru-Line wheel dressing tools; No. 2 deals with diamond-impregnated dressing tools; No. 3 covers the line of blast hole and exploration diamond drill bits manufactured by the company; No. 4 discusses radius-forming diamond tools.

Mine Supplies. Mosebach Electric & Supply Co., Pittsburgh, 3, Pa., has issued a 40-page catalog in which its line of mine supplies, including switches, haulage-way accessories, and welding equipment, is illustrated.

Welding Manganese Steel. A 17-page booklet showing methods and special shapes useful in maintenance and repair welding of manganese steel is available from Stultz-Sickles Co., Newark, 5, N. J., makers of Manganal rods and shapes.